CCS Technical Documentation
RH-12/RH-28 Series Transceivers

6(a) – Baseband Troubleshooting Instructions

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Introduction

This document describes in overview the different hardware error possibilities for the RH-12/RH-28 phone.

Not every possible hardware error is described in this document, but only those possible to correct.

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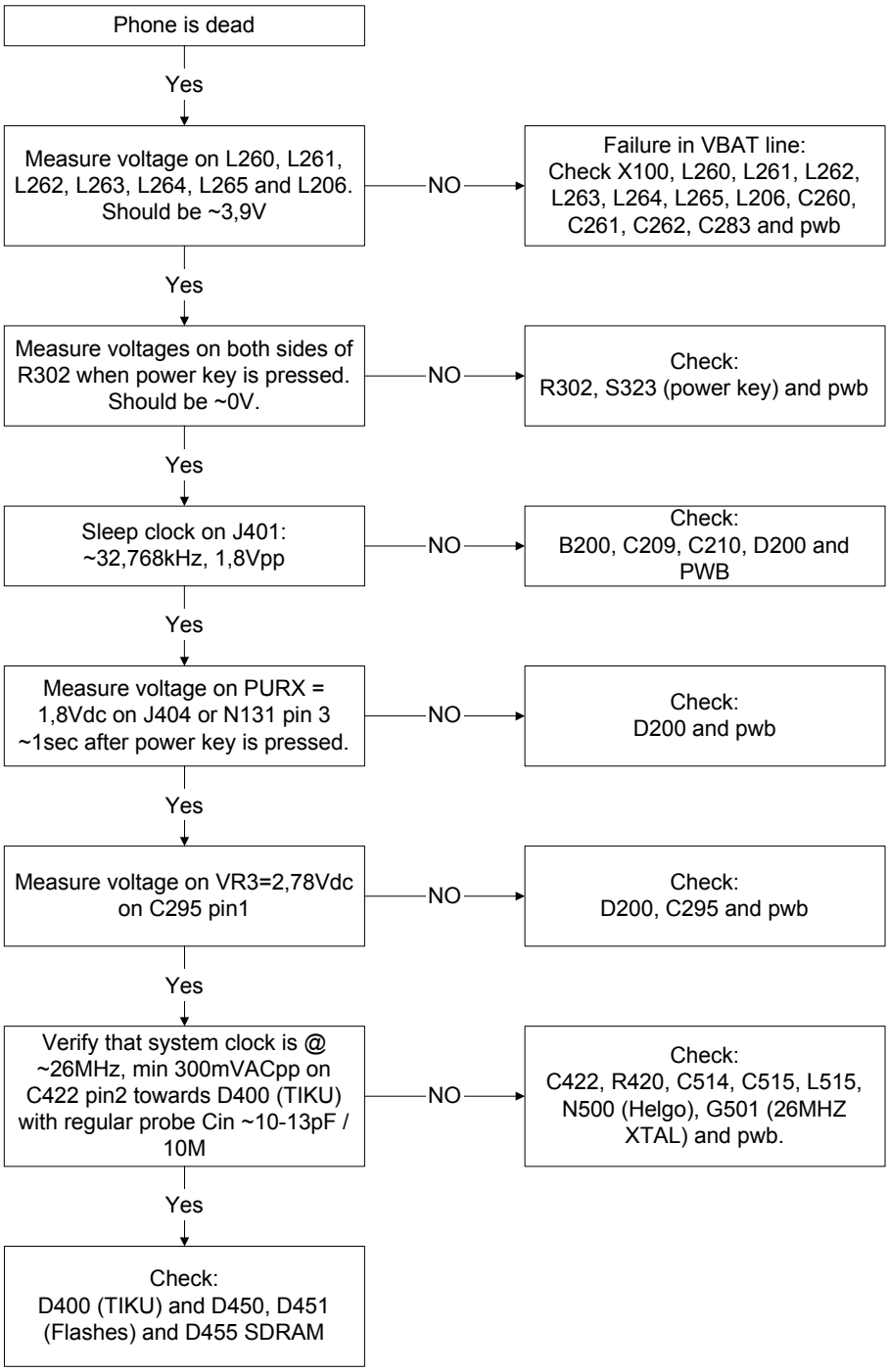
General Failures

Phone is dead

This means that the phone doesn't use any current at all when supply is connected and/ or power key is pressed.

It is assumed that the voltage supplied is 3,9Vdc. UEME will prevent any functionality at battery/supply levels below 2,9Vdc and the software will shut the phone down at 3,1Vdc.

Figure 1: Phone is dead


Phone is dead
Yes
Measure voltage on L260, L261, L262, L263, L264, L265 and L206. Should be ~3,9V
NO
Failure in VBAT line: Check X100, L260, L261, L262, L263, L264, L265, L206, C260, C261, C262, C283 and pwb
Yes
Measure voltages on both sides of R302 when power key is pressed. Should be ~0V.
NO
Check: R302, S323 (power key) and pwb
Yes
Sleep clock on J401: ~32,768kHz, 1,8Vpp
NO
Check: B200, C209, C210, D200 and PWB
Yes
Measure voltage on PURX = 1,8Vdc on J404 or N131 pin 3 ~1sec after power key is pressed.
NO
Check: D200 and pwb
Yes
Measure voltage on VR3=2,78Vdc on C295 pin1
NO
Check: D200, C295 and pwb
Yes
Verify that system clock is @ ~26MHz, min 300mVACpp on C422 pin2 towards D400 (TIKU) with regular probe Cin ~10-13pF / 10M
NO
Check: C422, R420, C514, C515, L515, N500 (Helgo), G501 (26MHZ XTAL) and pwb.
Yes
Check: D400 (TIKU) and D450, D451 (Flashes) and D455 SDRAM

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Flash programming doesn't work

The flash programming on RH-12/RH-28 boards is only possible via the pads on the PWB.

In case of Flash failure in production (FLALI station), problem is most likely related to SMD problems. Possible failures could be Short-circuiting of balls under µBGAs (e.g. UEME, TIKUEDGE, SDRAM, FLASH), missing or misaligned components.

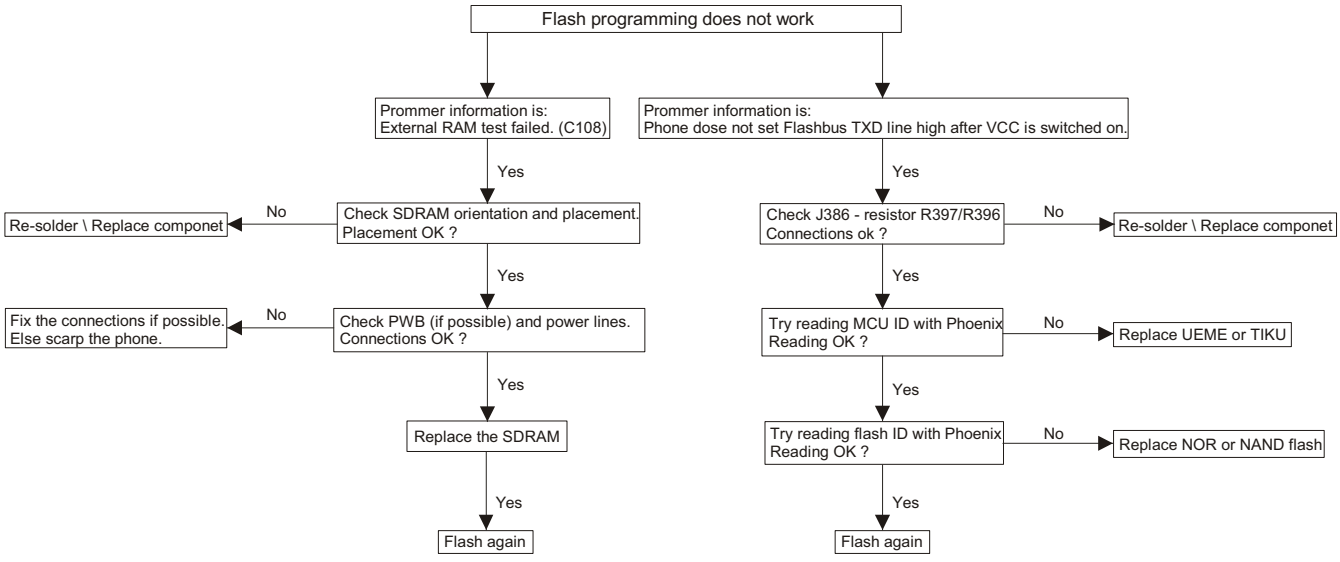
In flash programming error cases the flash prommer (via Phoenix or Darium) can give some information about the fault. The fault information messages could be:

- Phone doesn't set Flashbus TXD line high after VCC is switch on.
- External RAM test failed.

These errors are some of the most common errors and based on this, a fault finding diagram for flash programming is shown below. Various errors can appear from the prommer when flashing the phone - not all of them can be directly linked to the HW or phone.

Because of the use of uBGA components, it is not possible to verify on the diagram, if there is a short circuit in control and address/data lines on TIKUEDGE, NOR flash, NAND flash or SDRAM.

Figure 2: Flash programming does not work



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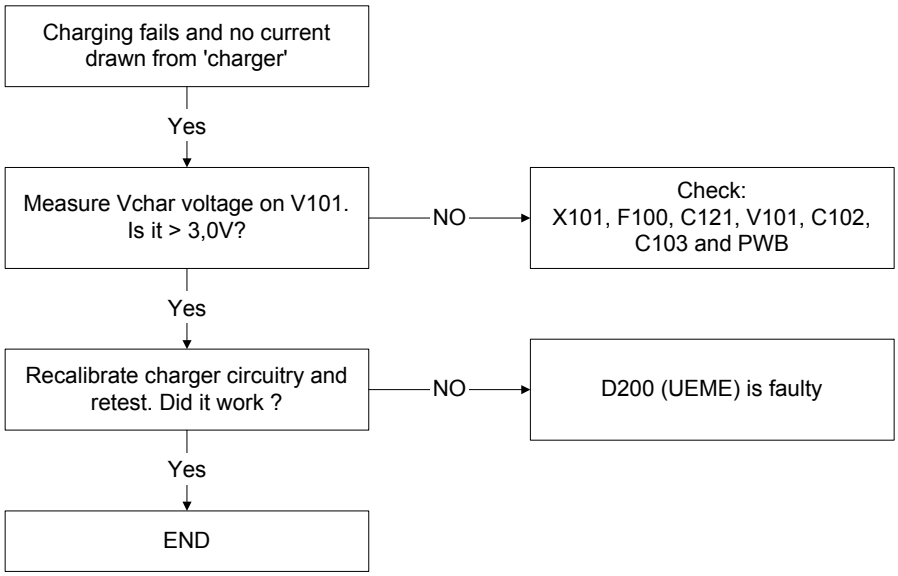
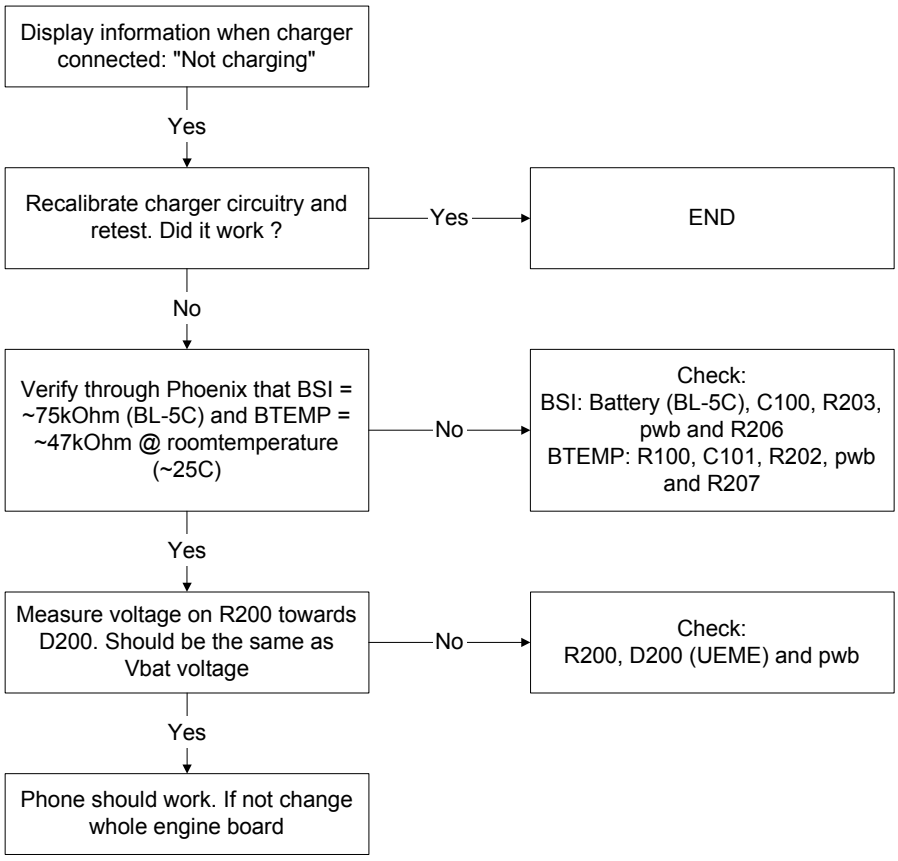
Charging Failure


Charging fails and no current drawn from 'charger'
Yes
Measure Vchar voltage on V101. Is it > 3,0V?
NO
Check: X101, F100, C121, V101, C102, C103 and PWB
Yes
Recalibrate charger circuitry and retest. Did it work ?
NO
D200 (UEME) is faulty
Yes
END


Display information when charger connected: "Not charging"
Yes
Recalibrate charger circuitry and retest. Did it work ?
Yes
END
No
Verify through Phoenix that BSI = ~75kOhm (BL-5C) and BTEMP = ~47kOhm @ roomtemperature (~25C)
No
Check: BSI: Battery (BL-5C), C100, R203, pwb and R206 BTEMP: R100, C101, R202, pwb and R207
Yes
Measure voltage on R200 towards D200. Should be the same as Vbat voltage
No
Check: R200, D200 (UEME) and pwb
Yes
Phone should work. If not change whole engine board

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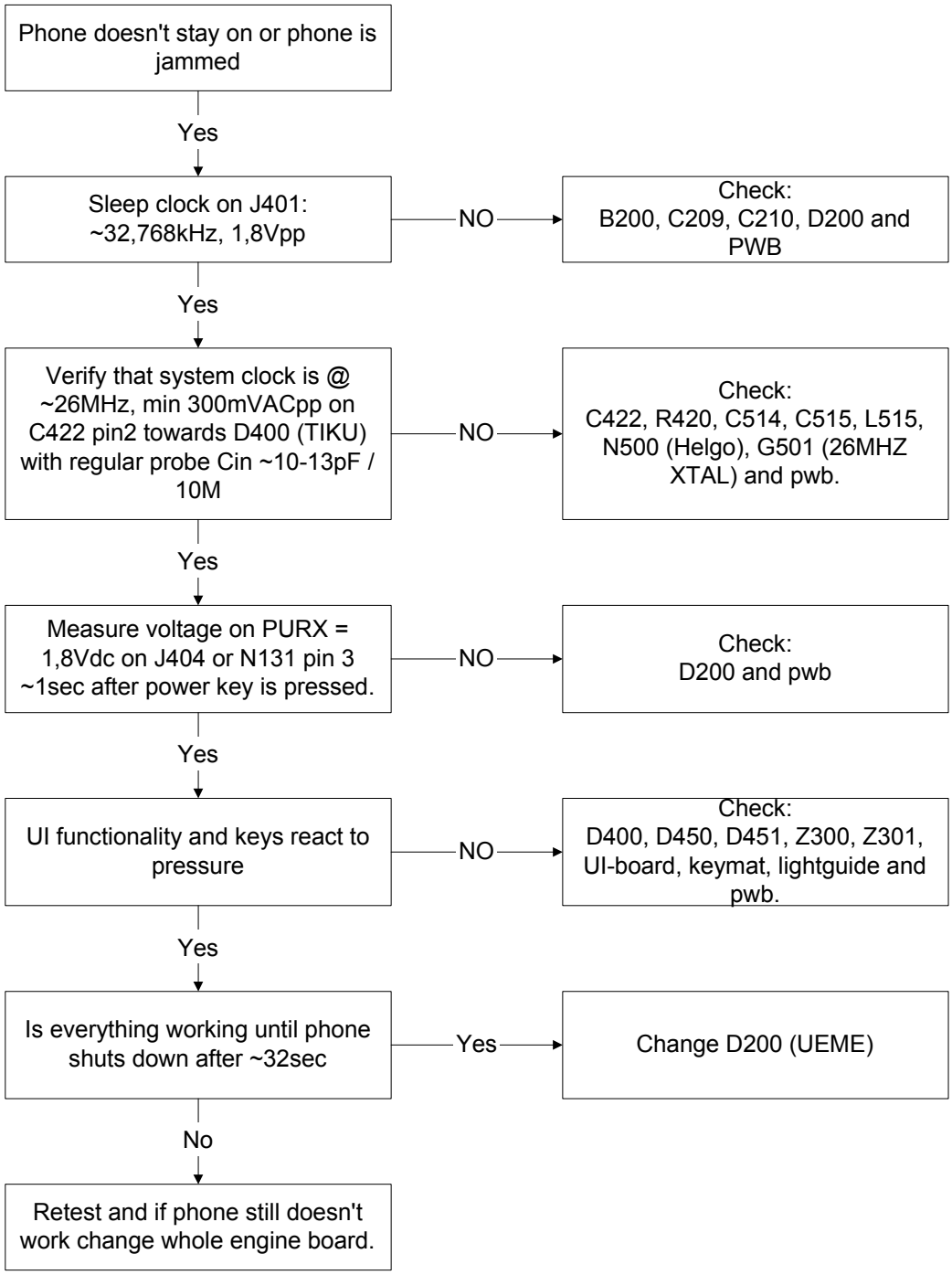
Phone doesn't stay on, or phone is jammed

If this kind of a failure is presenting itself immediately after FLALI, it is most likely caused by ASICs missing contact with PWB.

If the MCU doesn't service the watchdog register within the UEME, the operations watchdog will run out after approximately 32 seconds. It is not possible to measure this service routine.

Figure 3: Phone doesn't stay on, or is jammed


Phone doesn't stay on or phone is jammed
Yes
Sleep clock on J401: ~32,768kHz, 1,8Vpp
NO
Check: B200, C209, C210, D200 and PWB
Yes
Verify that system clock is @ ~26MHz, min 300mVACpp on C422 pin2 towards D400 (TIKU) with regular probe Cin ~10-13pF / 10M
NO
Check: C422, R420, C514, C515, L515, N500 (Helgo), G501 (26MHZ XTAL) and pwb.
Yes
Measure voltage on PURX = 1,8Vdc on J404 or N131 pin 3 ~1sec after power key is pressed.
NO
Check: D200 and pwb
Yes
UI functionality and keys react to pressure
NO
Check: D400, D450, D451, Z300, Z301, UI-board, keymat, lightguide and pwb.
Yes
Is everything working until phone shuts down after ~32sec
Yes
Change D200 (UEME)
No
Retest and if phone still doesn't work change whole engine board.

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Display Information: "Contact Service"

When this error appears in the display it means that one or more of the internal baseband tests has failed. The baseband tests (self tests) are performed each time the phone is powered on. The self tests are divided into those performed while powering up (Start up tests) and the ones that can be executed with a PC using Phoenix (Runtime tests). The following Start-up tests are performed during power up:

UEM CBUS IF TEST
SLEEP X LOOP TEST
AUX DA LOOP TEST
EAR DATA LOOP TEST
TX IDP LOOP TEST
TX IQ DP LOOP TEST
SIM CLK LOOP TEST
SIM IO CTRL LOOP TEST
MBUS RX TX LOOP TEST
BACKUP BATT TEST
RADIO TEST
WARRANTY TEST
PA TEMP TEST
SIM LOCK TEST
PPM VALIDITY TEST
KEYBOARD STUCK TEST
LPRF IF TEST
FLASH CHECKSUM TEST
CAMERA IF TEST
EXT RAM DATA BUS TEST
EXT RAM ADDR BUS TEST
NAND FLASH ID TEST
BT WAKEUP TEST
IR IF_TEST

If all these self tests are passed, the phone will start up.

From Phoenix it's possible to run all the self tests and the additional "Runtime test". The test cases can be seen below.

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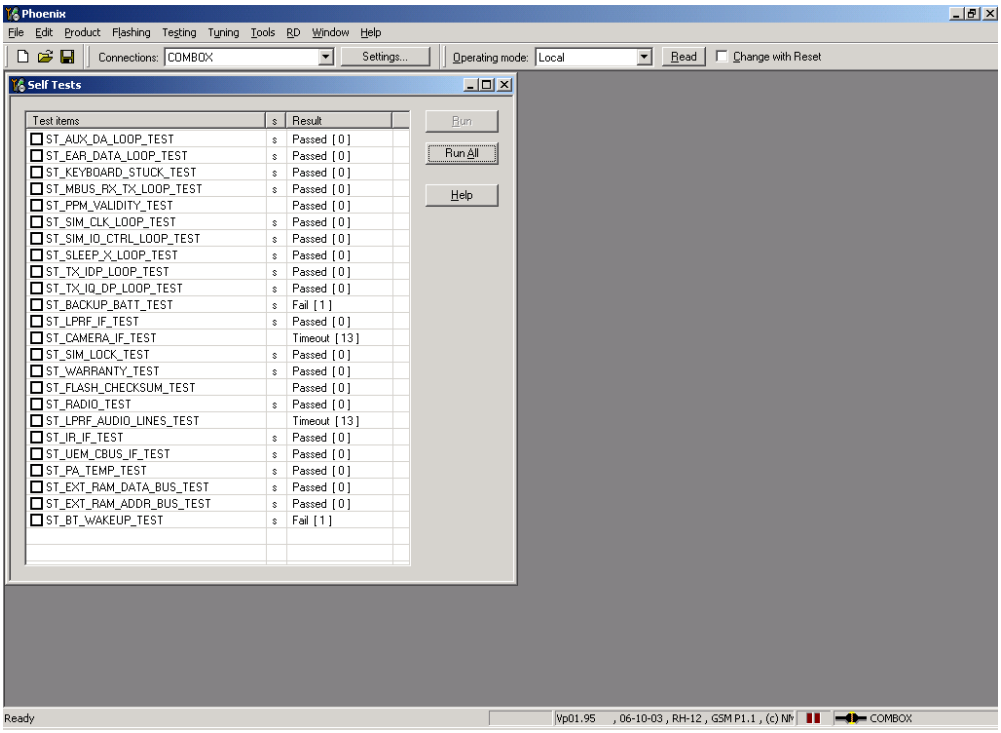
Figure 4: Display Information: "Contact Service"



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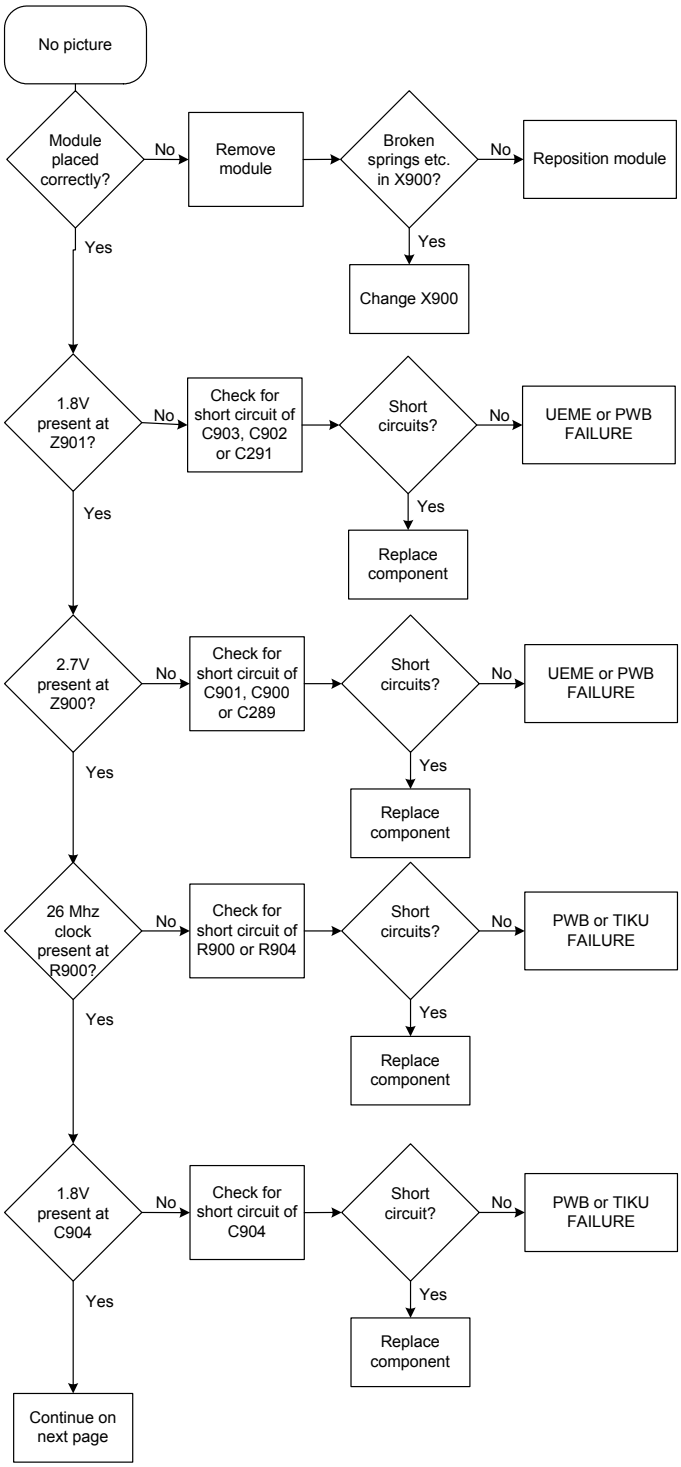
Function Failures

Camera Failure

No picture



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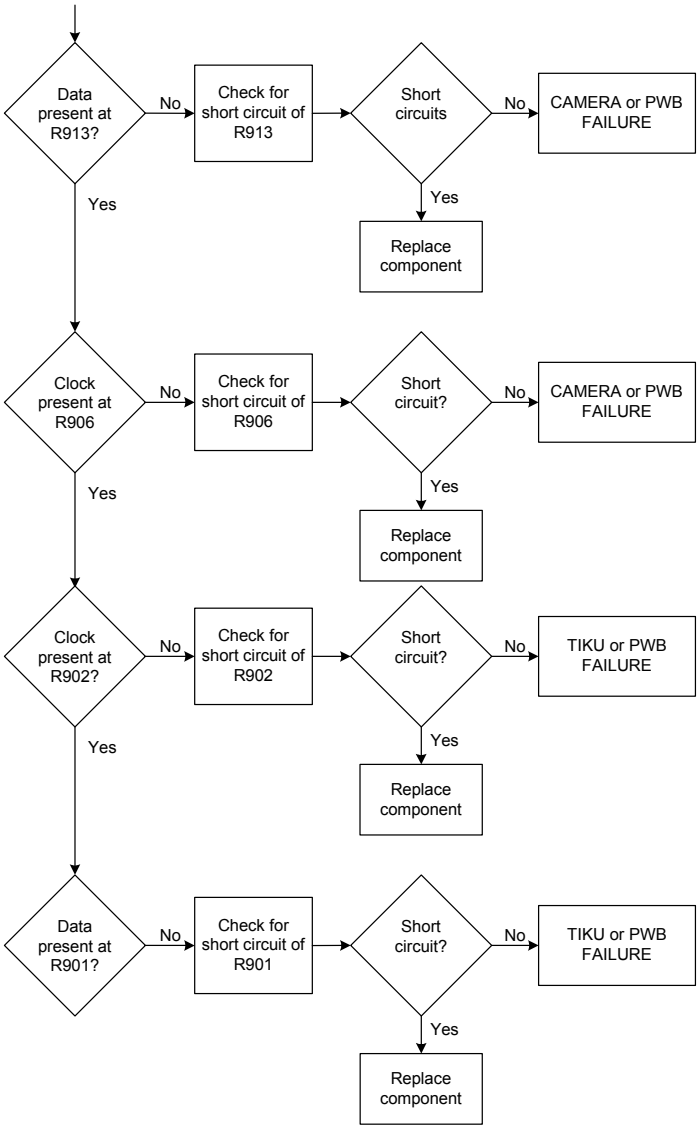
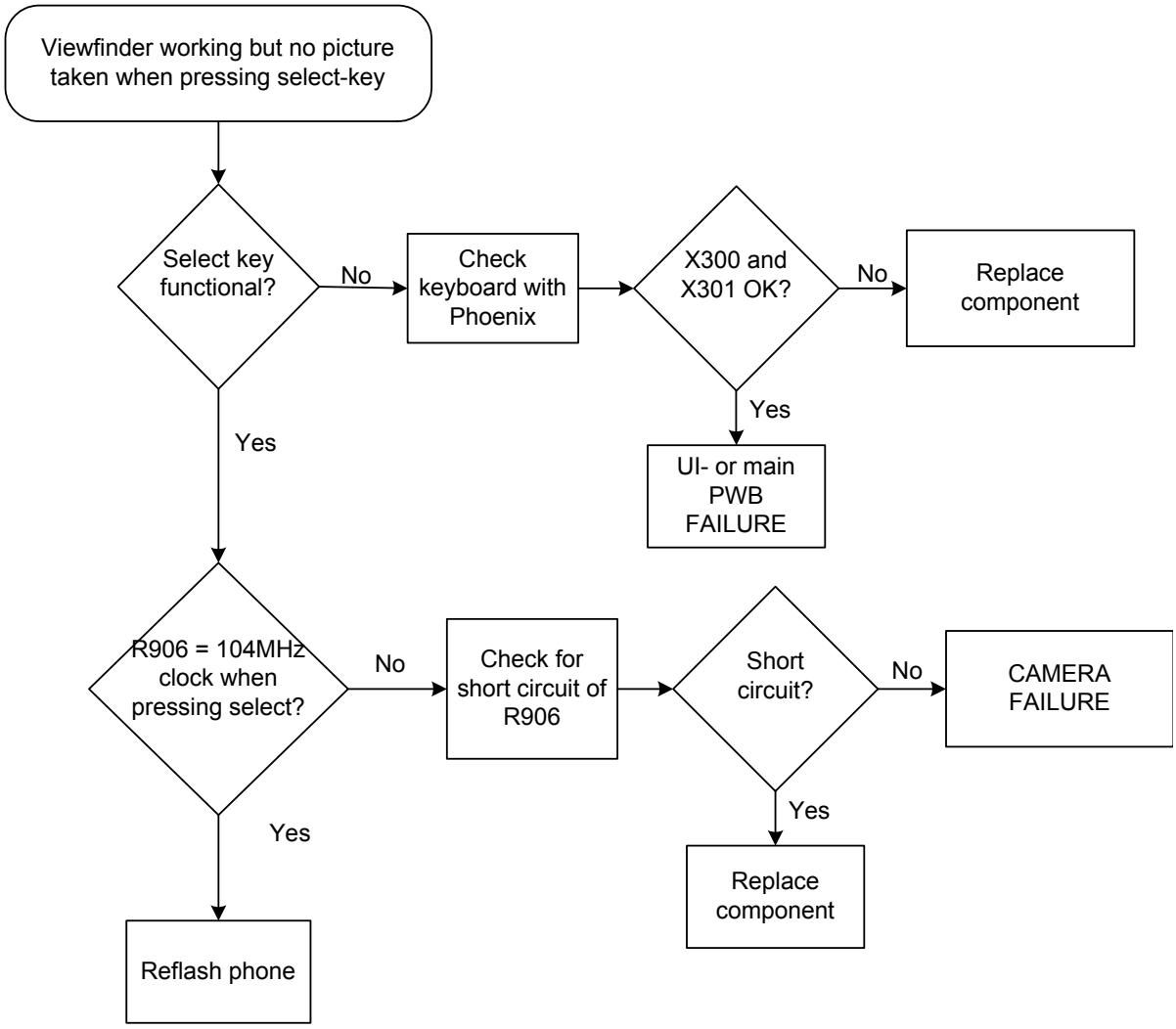

Data present at R913?
No
Check for short circuit of R913
Short circuits
No
CAMERA or PWB FAILURE
Yes
Yes
Replace component
Clock present at R906
No
Check for short circuit of R906
Short circuit?
No
CAMERA or PWB FAILURE
Yes
Yes
Replace component
Clock present at R902?
No
Check for short circuit of R902
Short circuit?
No
TIKU or PWB FAILURE
Yes
Yes
Replace component
Data present at R901?
No
Check for short circuit of R901
Short circuit?
No
TIKU or PWB FAILURE
Yes
Replace component

Viewfinder working but no picture taken when pressing select-key



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FM-radio Failure

The FM-radio troubleshooting guide is placed in the RF section.

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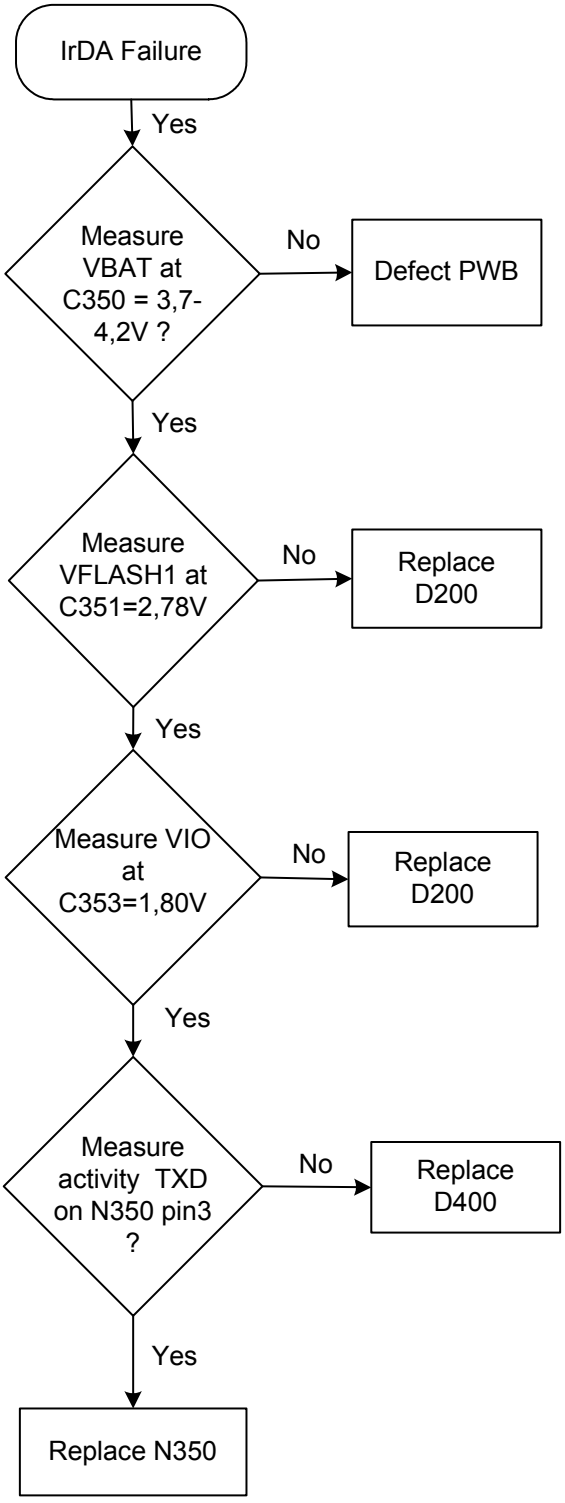
Infrared Communication Failure



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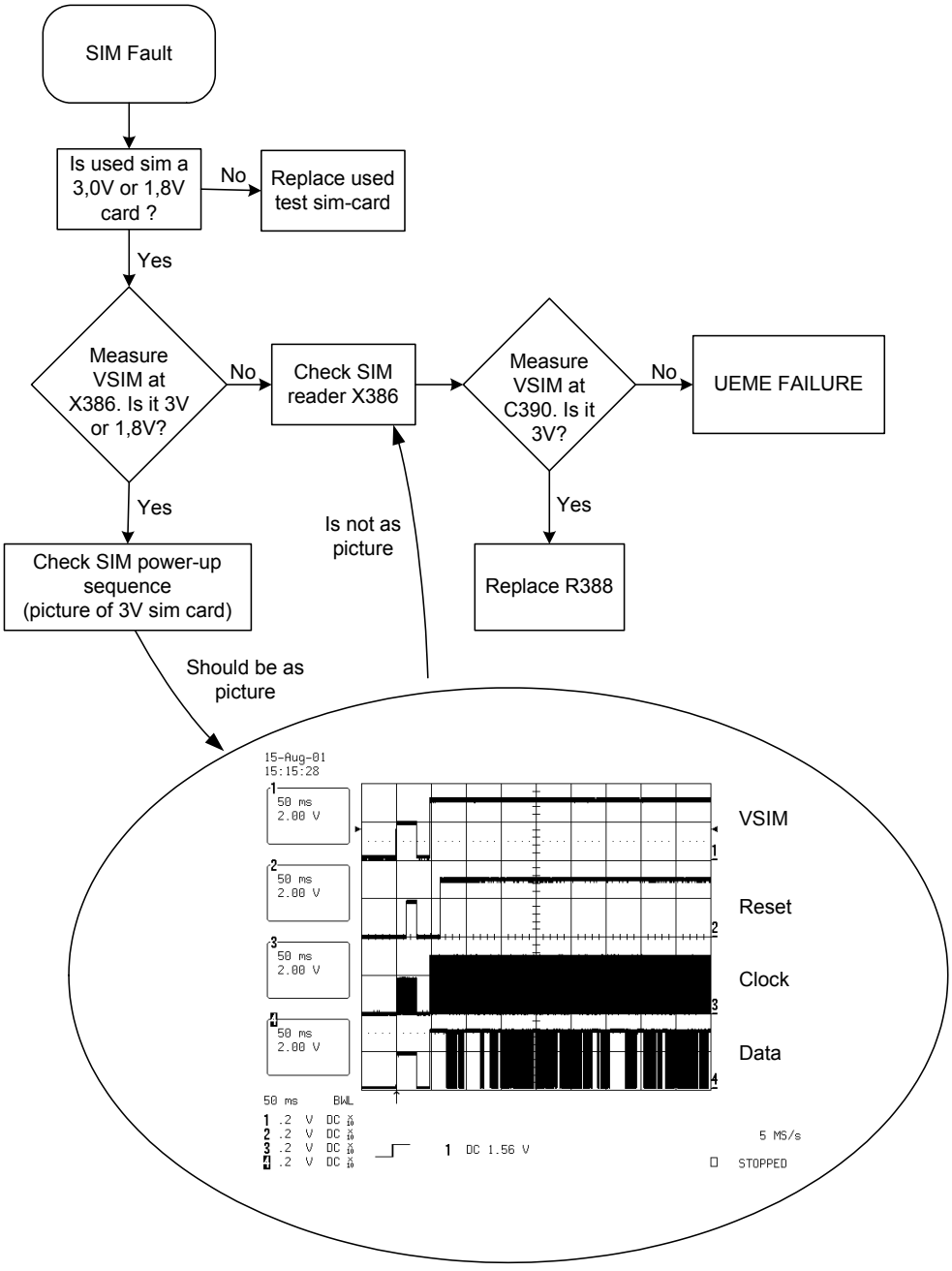
SIM Failure

The hardware of the SIM interface from the UEME (D200) to the SIM connector (X386) can be tested without a SIM card. When the power is switched on, the phone first checks for a 1,8V SIM card and then a 3V SIM card. The phone will try this four times, whereafter it will display "Insert SIM card".

The error "SIM card rejected" means that the ATR message received from the SIM card is corrupted, e.g. data signal levels are wrong. The first data is always ATR and it is sent from card to phone.

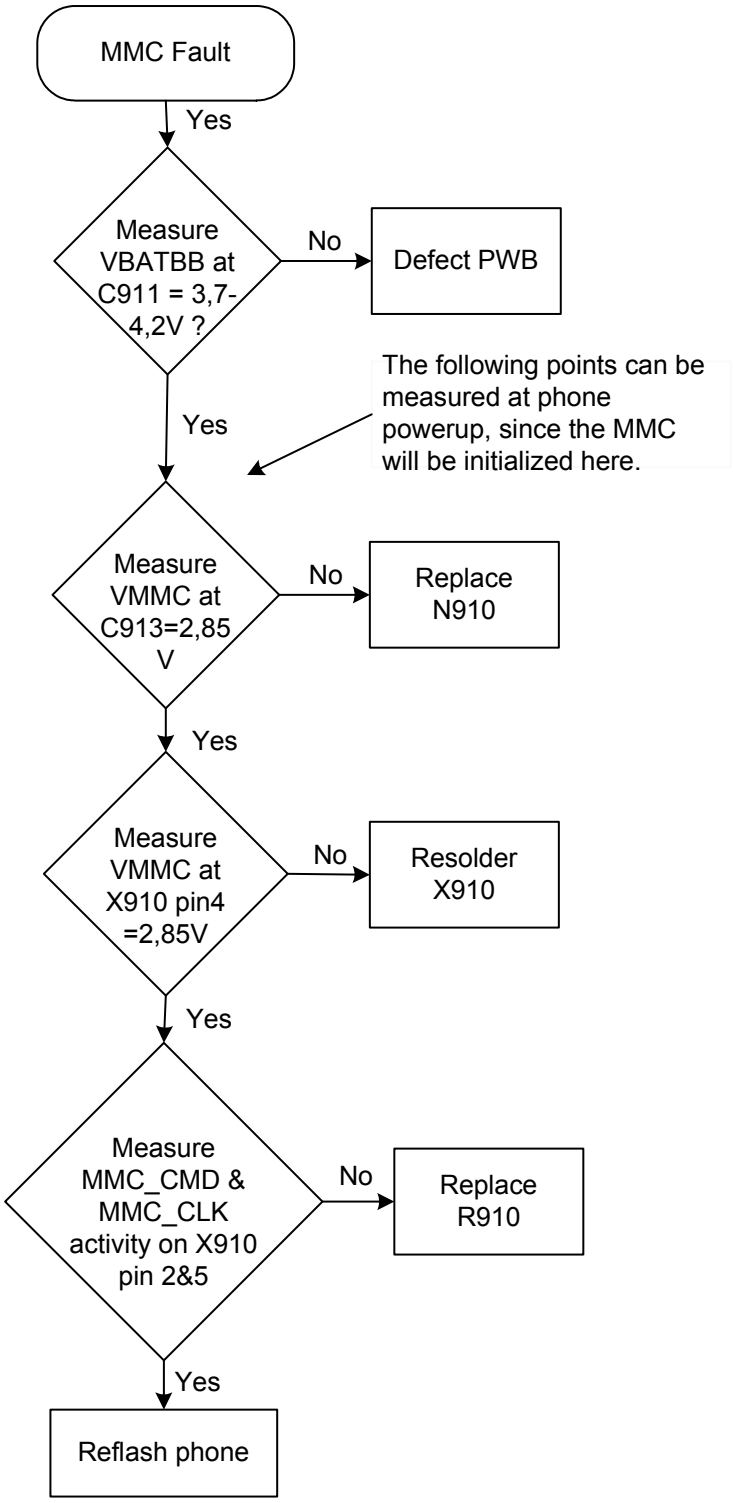
Figure 5: SIM Failure



MMC Failure

The hardware of the MMC interface from the UEME (D200) to the MMC connector (X910) can't be tested without a MMC card. To be able to measure the following, solder wires on respective points.

Figure 6: MMC Failure



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Bluetooth Failure

The Bluetooth troubleshooting guide is placed in the RF section.

When the flash D450 or UEME has been replaced the IMEI has to be reprogrammed. This will automatically include reprogramming of the BT address.

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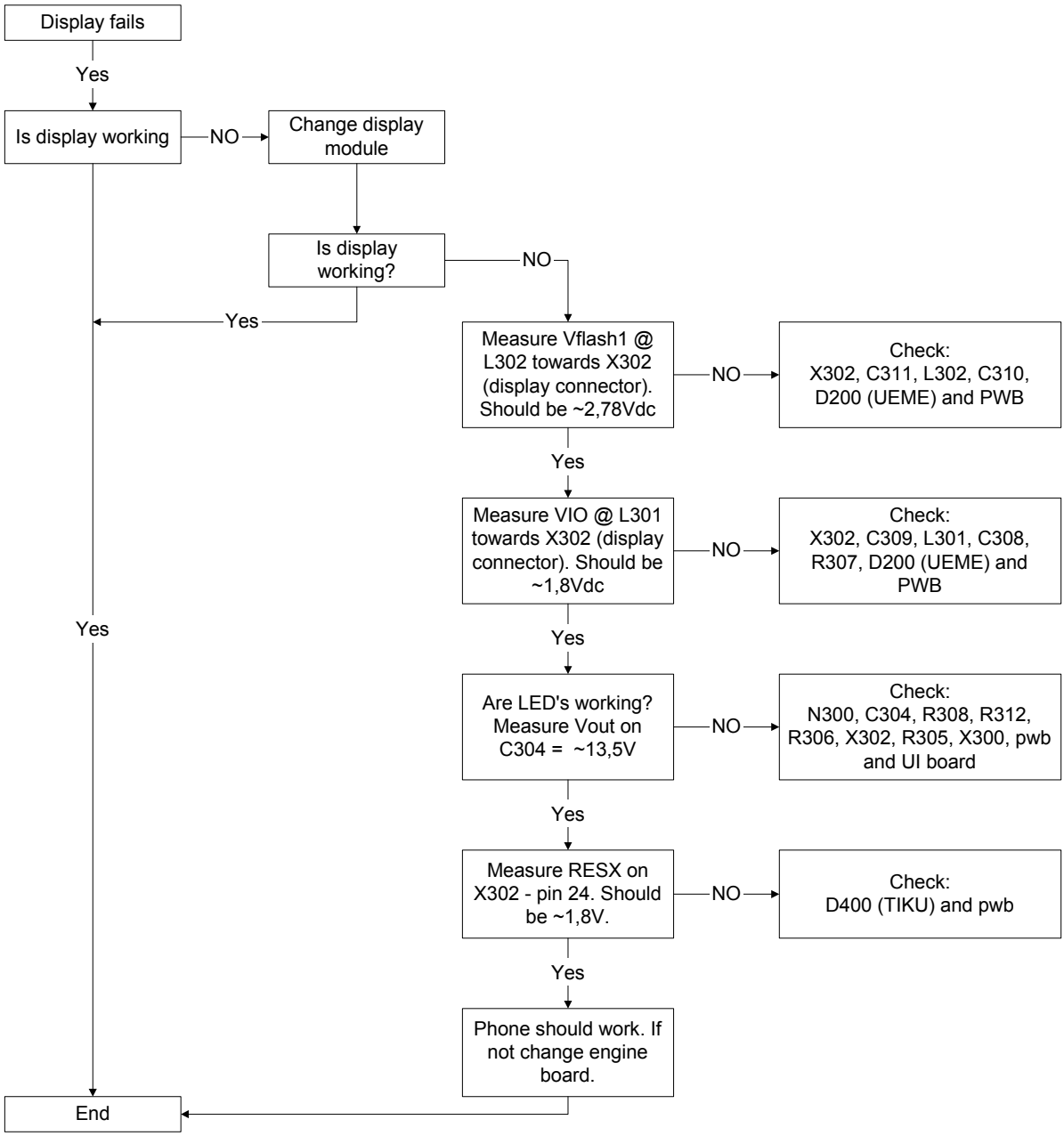
Display Failure


Display fails
Yes
Is display working
NO
Change display module
Is display working?
NO
Yes
Yes
Measure Vflash1 @ L302 towards X302 (display connector). Should be ~2,78Vdc
NO
Check: X302, C311, L302, C310, D200 (UEME) and PWB
Yes
Measure VIO @ L301 towards X302 (display connector). Should be ~1,8Vdc
NO
Check: X302, C309, L301, C308, R307, D200 (UEME) and PWB
Yes
Yes
Are LED's working? Measure Vout on C304 = ~13,5V
NO
Check: N300, C304, R308, R312, R306, X302, R305, X300, pwb and UI board
Yes
Measure RESX on X302 - pin 24. Should be ~1,8V.
NO
Check: D400 (TIKU) and pwb
Yes
Phone should work. If not change engine board.
End

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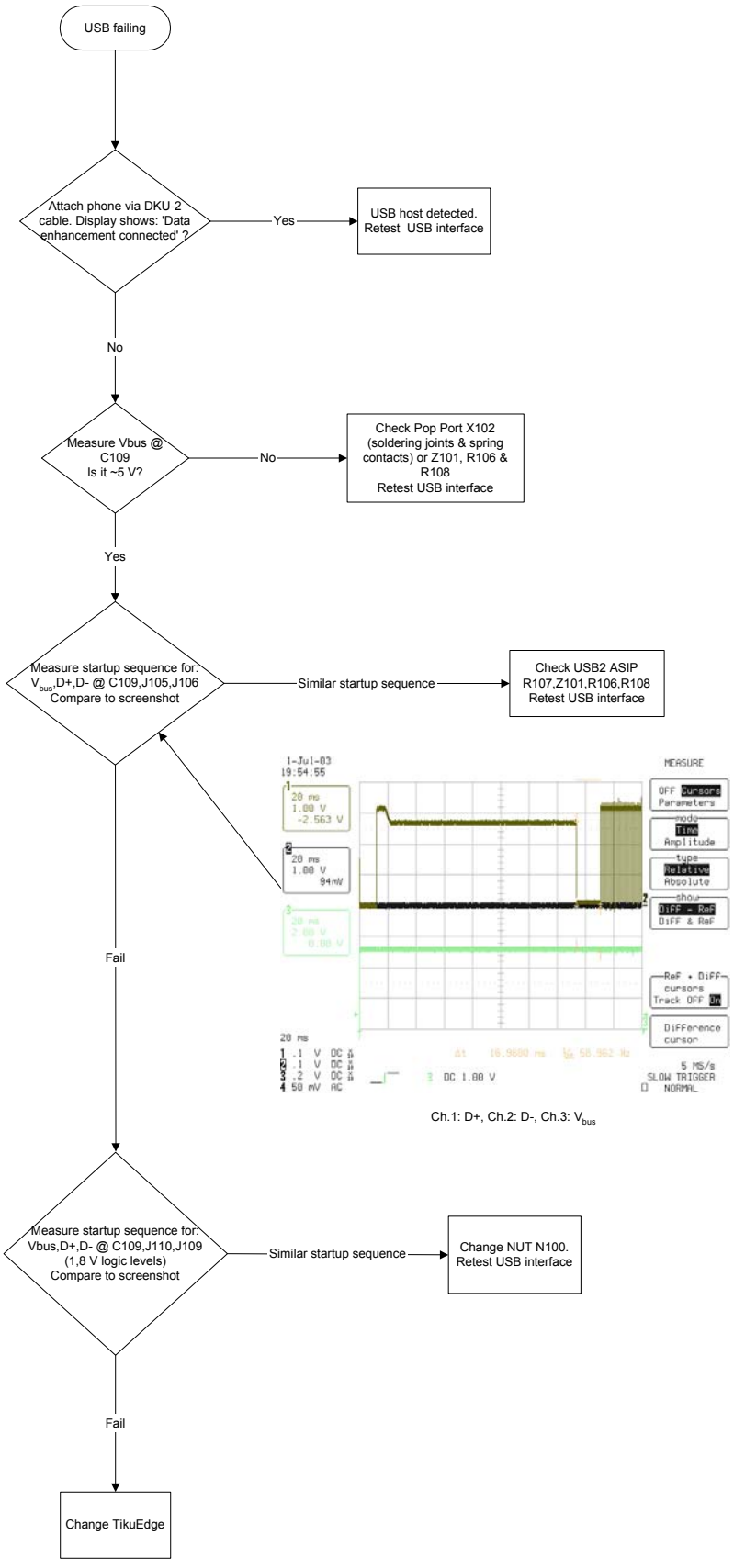
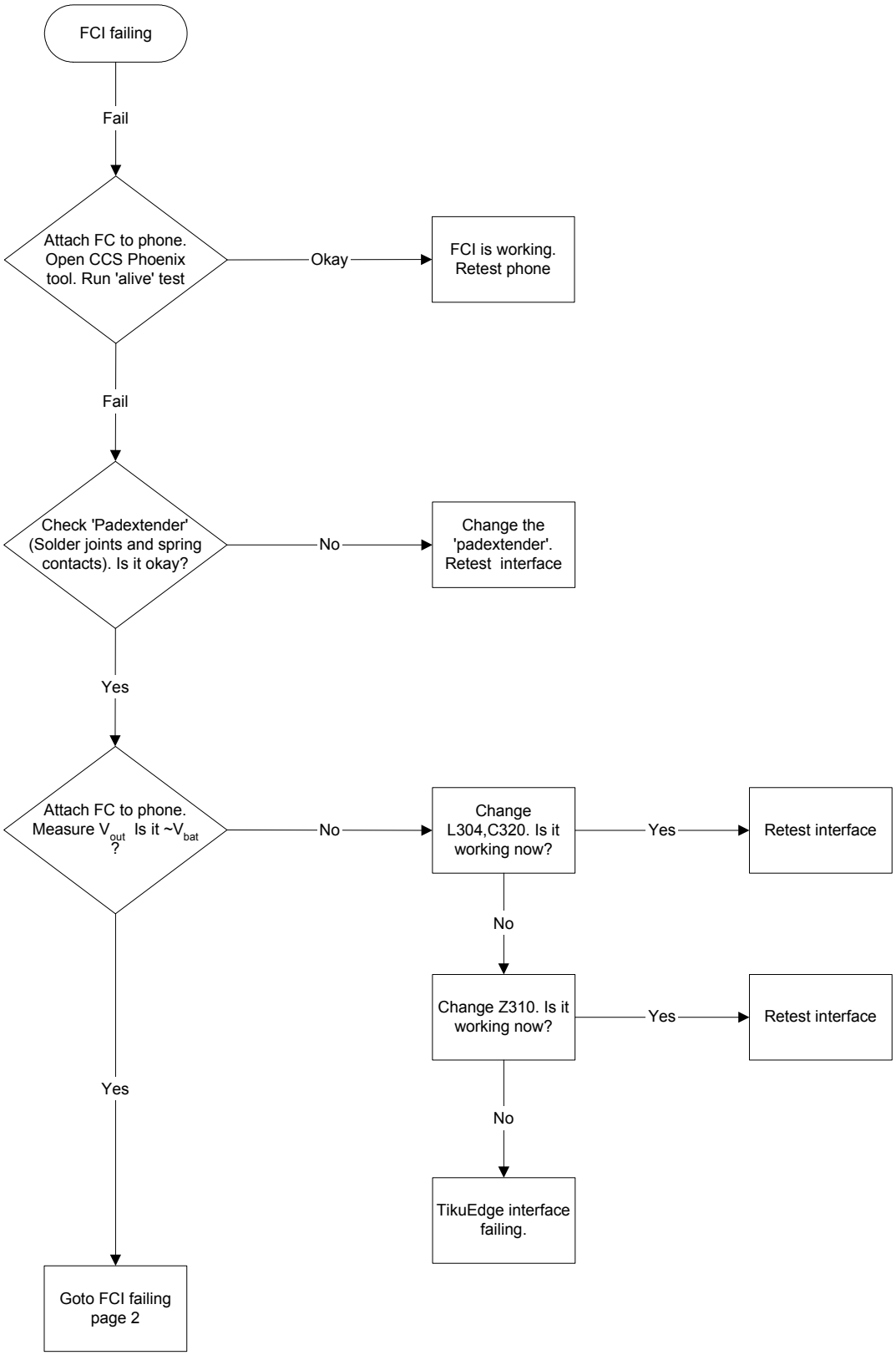
USB Data Transmission Failure


USB failing
Attach phone via DKU-2 cable. Display shows: 'Data enhancement connected' ?
Yes
USB host detected. Retest USB interface
No
Measure Vbus @ C109 Is it ~5 V?
No
Check Pop Port X102 (soldering joints & spring contacts) or Z101, R106 & R108 Retest USB interface
Yes
Measure startup sequence for: Vbus,D+,D- @ C109,J105,J106 Compare to screenshot
Similar startup sequence
Check USB2 ASIP R107,Z101,R106,R108 Retest USB interface
Fail
Measure startup sequence for: Vbus,D+,D- @ C109,J110,J109 (1,8 V logic levels) Compare to screenshot
Similar startup sequence
Change NUT N100. Retest USB interface
Fail
Change TikuEdge

Ch.1: D+, Ch.2: D-, Ch.3: V_{bus}

Functional Cover Failure



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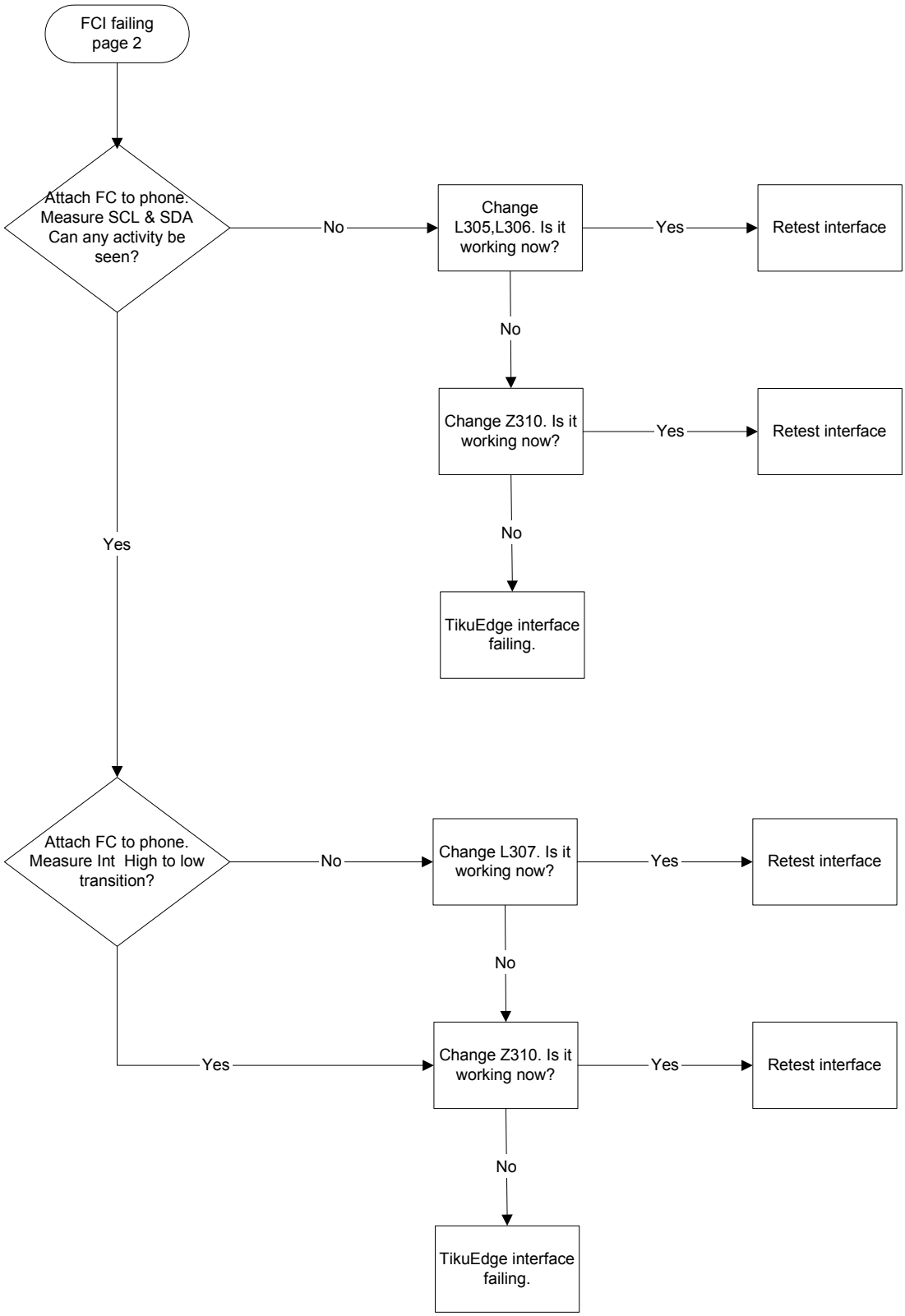
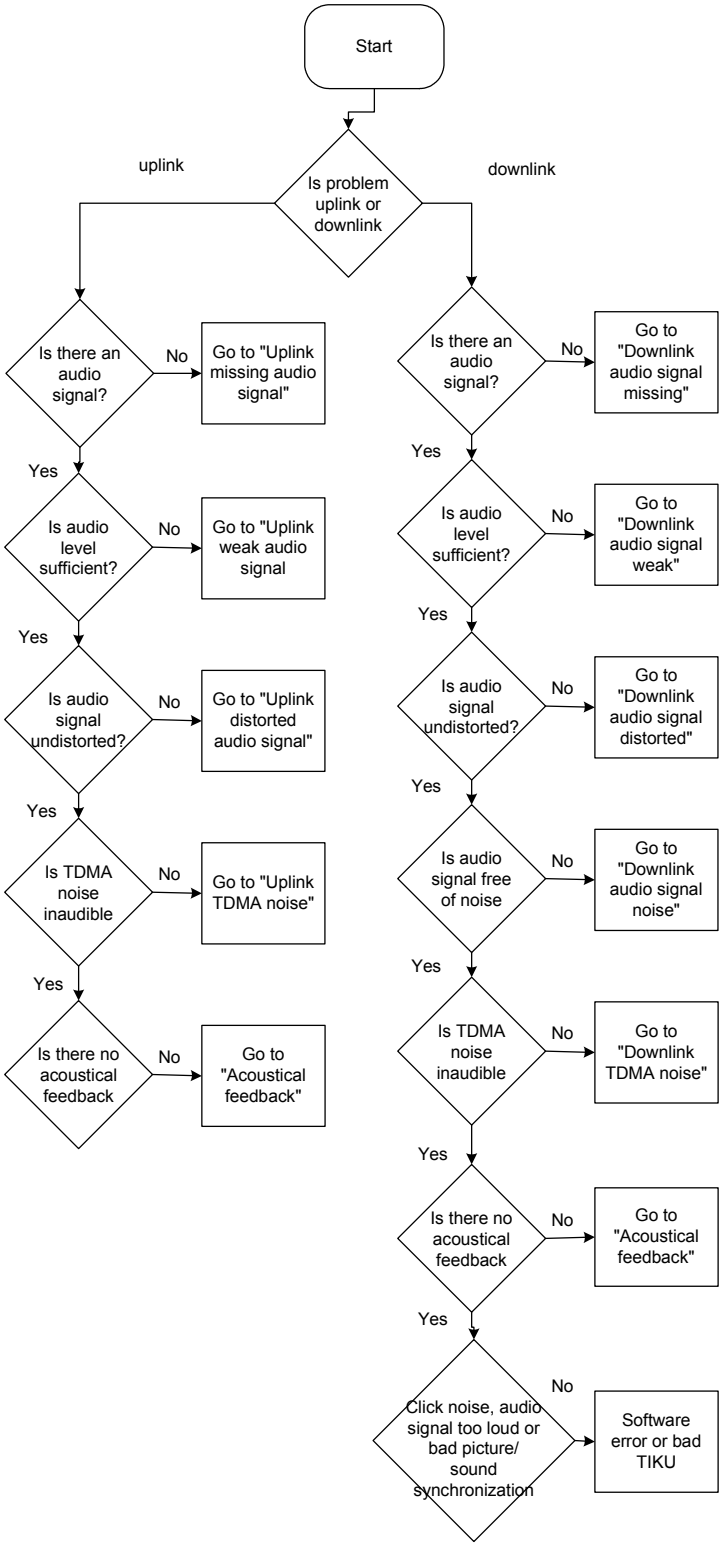

FCI failing page 2
Attach FC to phone. Measure SCL & SDA Can any activity be seen?
No
Change L305,L306. Is it working now?
Yes
Retest interface
No
Change Z310. Is it working now?
Yes
Retest interface
No
TikuEdge interface failing.
Yes
Attach FC to phone. Measure Int High to low transition?
No
Change L307. Is it working now?
Yes
Retest interface
No
Yes
Change Z310. Is it working now?
Yes
Retest interface
No
TikuEdge interface failing.

Audio Failure

Uplink or downlink failure



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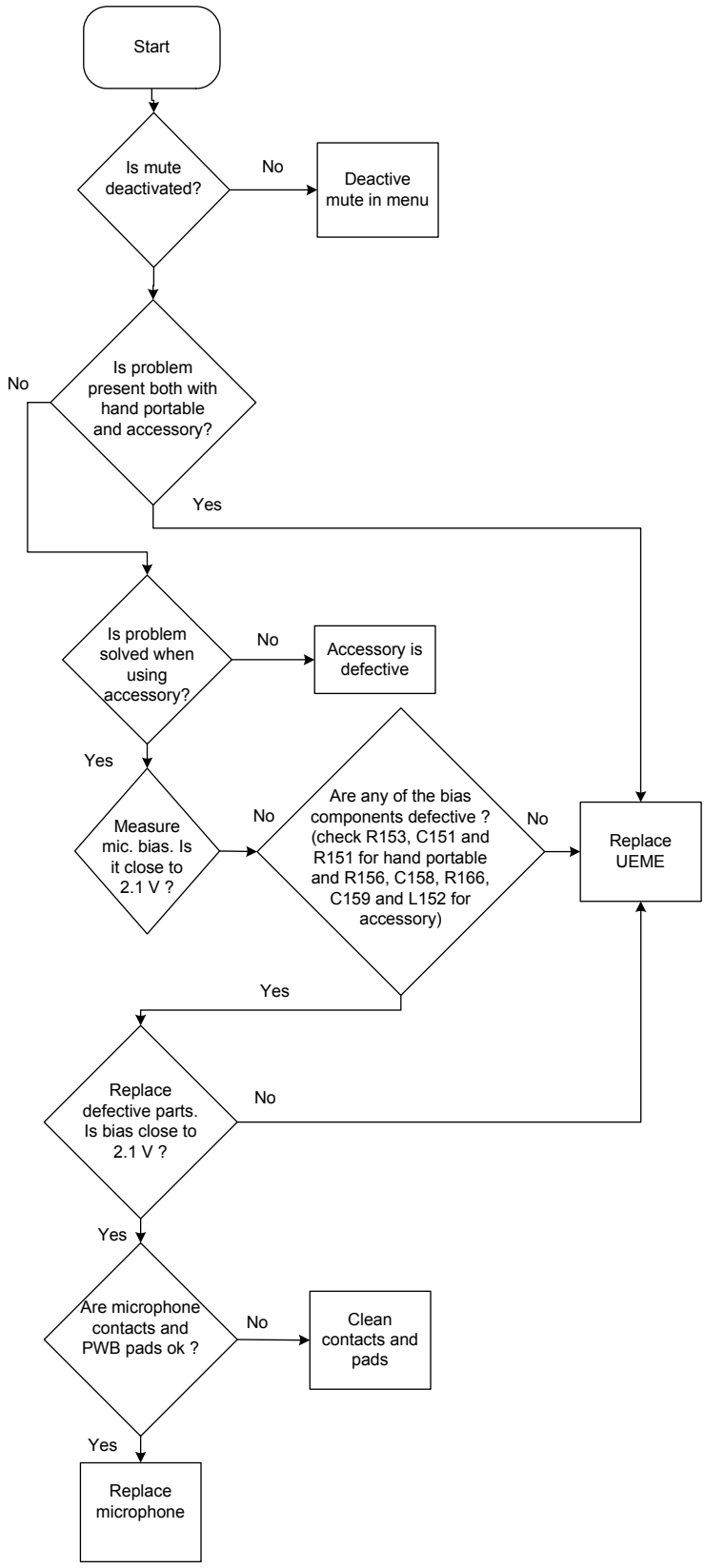
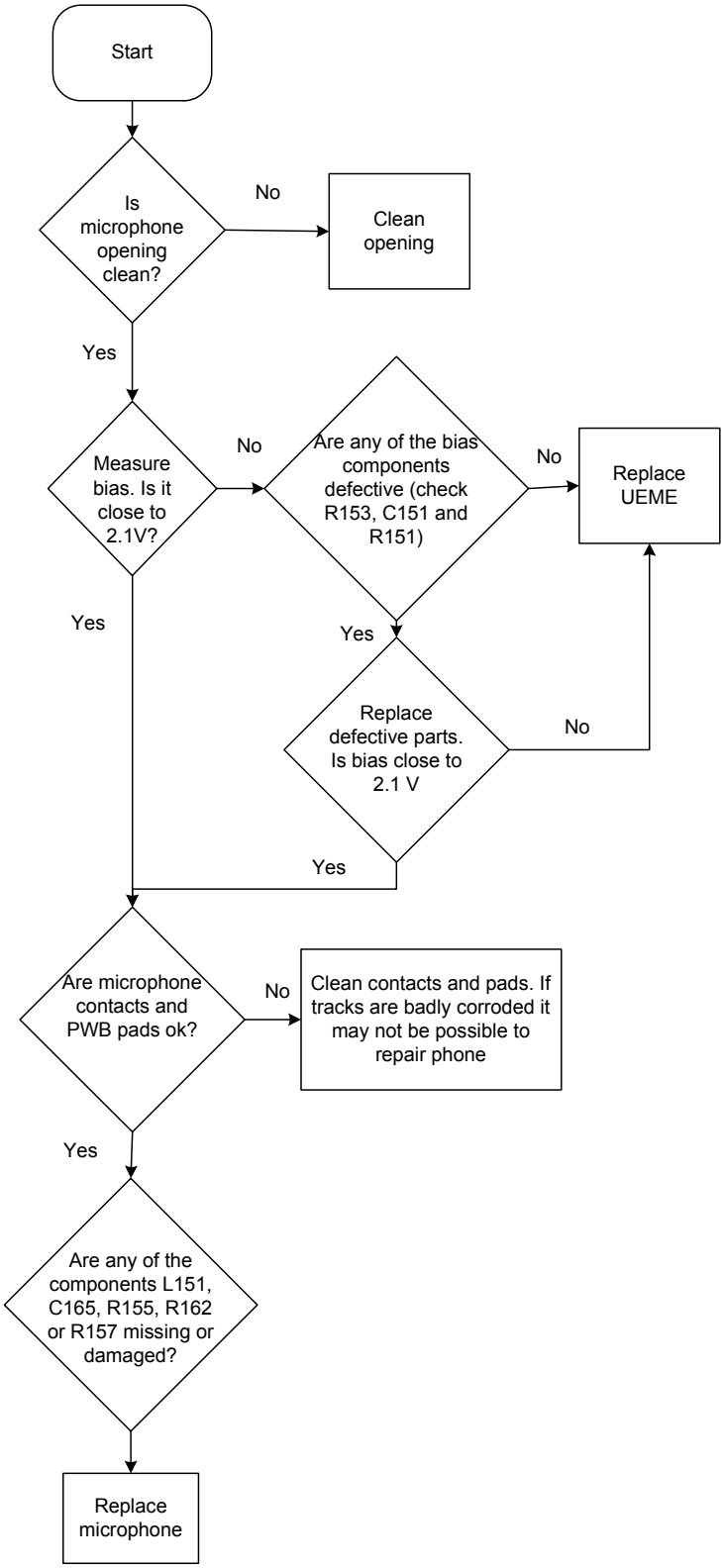
Uplink missing audio signal


Start
Is mute deactivated?
No
Deactive mute in menu
Is problem present both with hand portable and accessory?
No
Yes
Is problem solved when using accessory?
No
Accessory is defective
Yes
Measure mic. bias. Is it close to 2.1 V ?
No
Are any of the bias components defective ? (check R153, C151 and R151 for hand portable and R156, C158, R166, C159 and L152 for accessory)
No
Replace UEME
Yes
Replace defective parts. Is bias close to 2.1 V ?
No
Yes
Are microphone contacts and PWB pads ok ?
No
Clean contacts and pads
Yes
Replace microphone

Uplink weak audio signal


Start
Is microphone opening clean?
No
Clean opening
Yes
Measure bias. Is it close to 2.1V?
No
Are any of the bias components defective (check R153, C151 and R151)
No
Replace UEME
Yes
Yes
Replace defective parts. Is bias close to 2.1 V
No
Yes
Are microphone contacts and PWB pads ok?
No
Clean contacts and pads. If tracks are badly corroded it may not be possible to repair phone
Yes
Are any of the components L151, C165, R155, R162 or R157 missing or damaged?
Replace microphone

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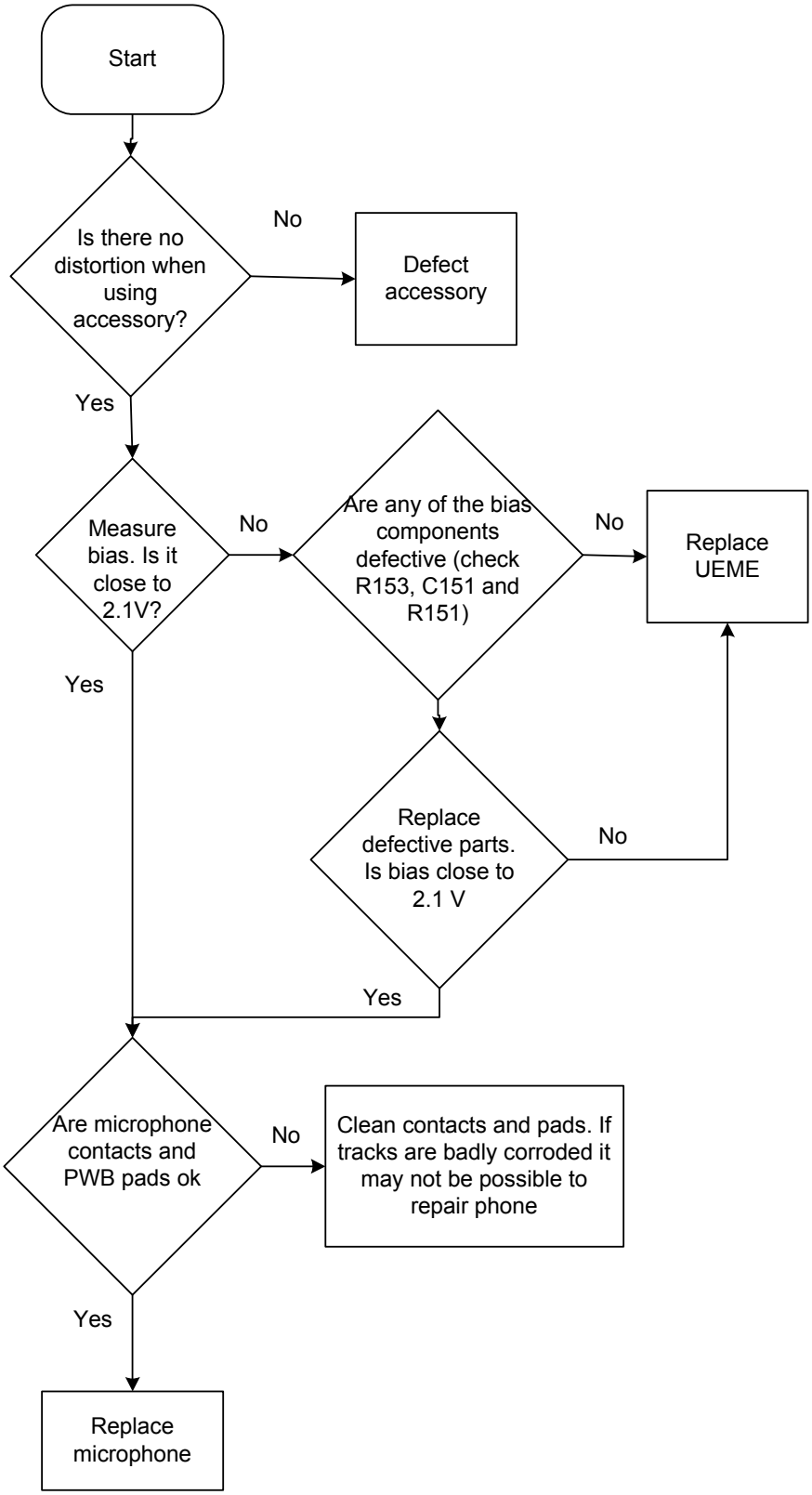
Uplink distorted audio signal



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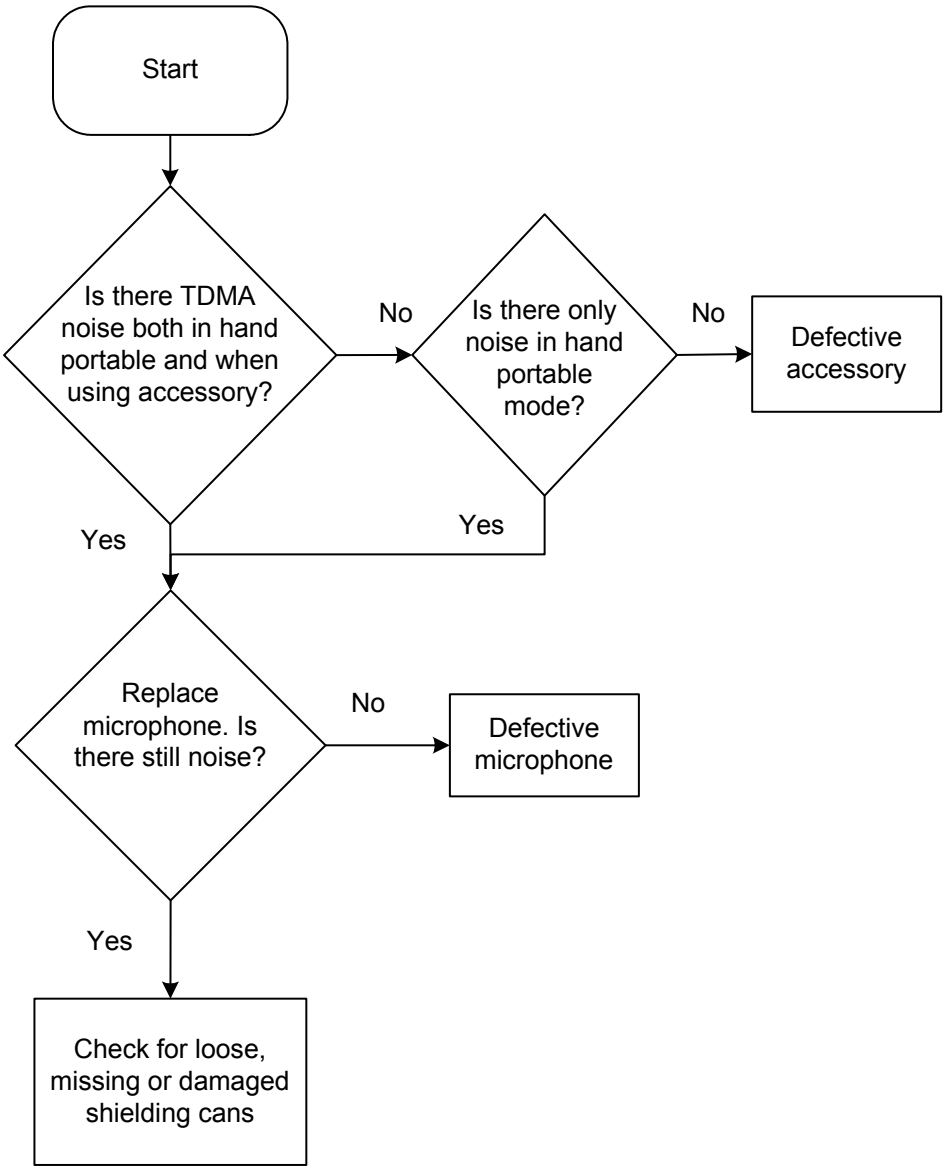
Uplink TDMA noise



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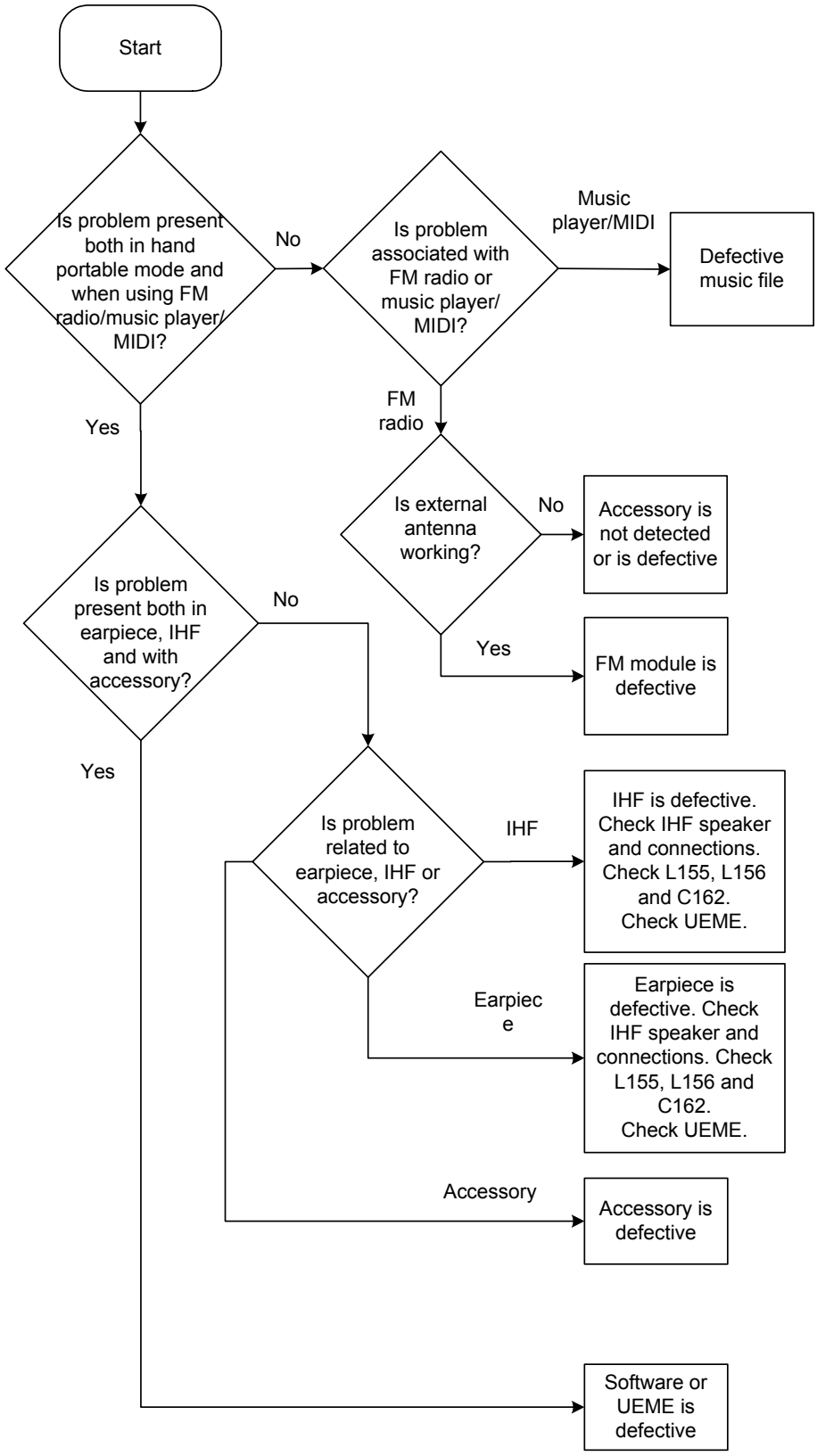
Downlink missing audio signal


Start
Is problem present both in hand portable mode and when using FM radio/music player/ MIDI?
No
Is problem associated with FM radio or music player/ MIDI?
Music player/MIDI
Defective music file
FM radio
Yes
Is external antenna working?
No
Accessory is not detected or is defective
Yes
FM module is defective
Is problem present both in earpiece, IHF and with accessory?
No
Yes
Is problem related to earpiece, IHF or accessory?
IHF
IHF is defective. Check IHF speaker and connections. Check L155, L156 and C162. Check UEME.
Earpiec e
Earpiece is defective. Check IHF speaker and connections. Check L155, L156 and C162. Check UEME.
Accessory
Accessory is defective
Software or UEME is defective

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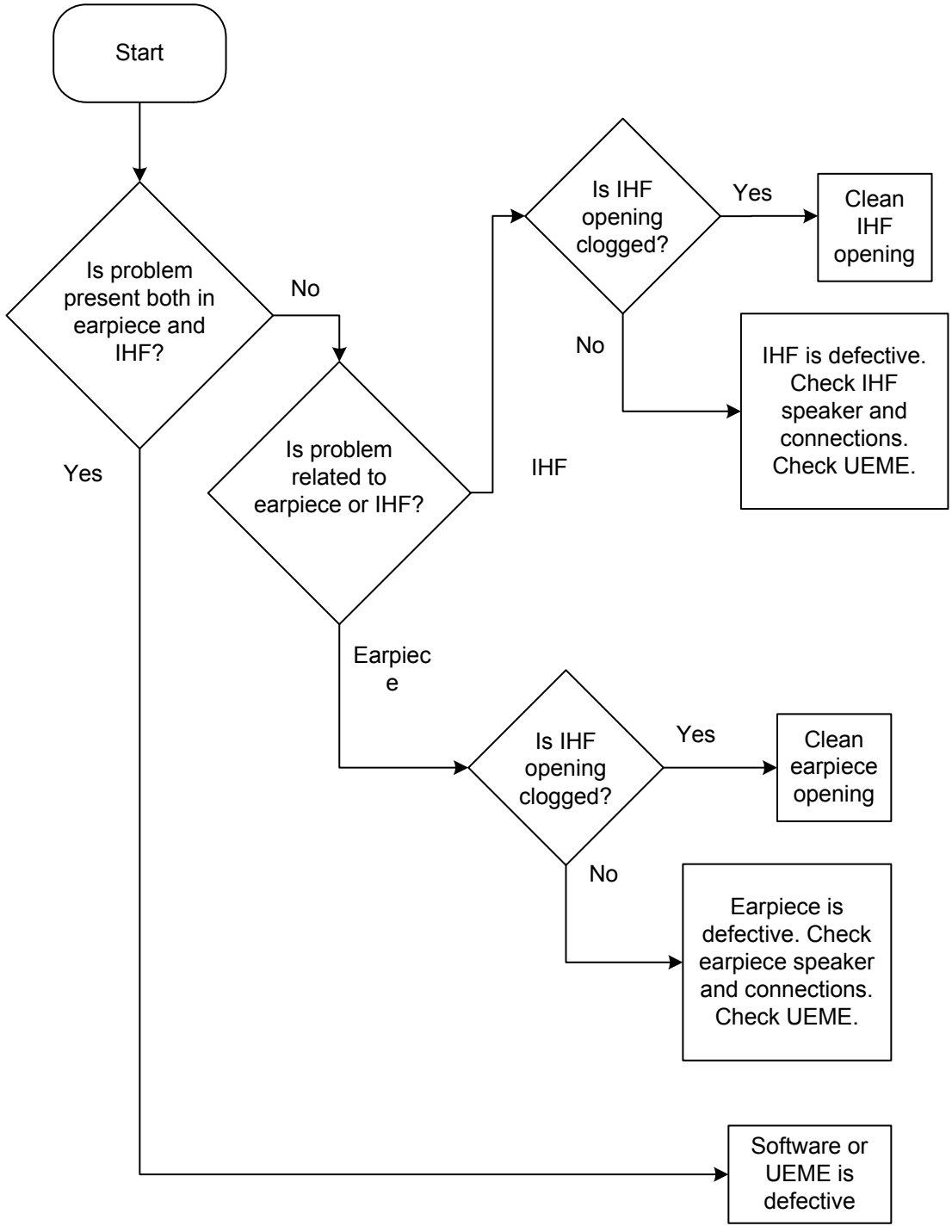
Downlink weak audio signal



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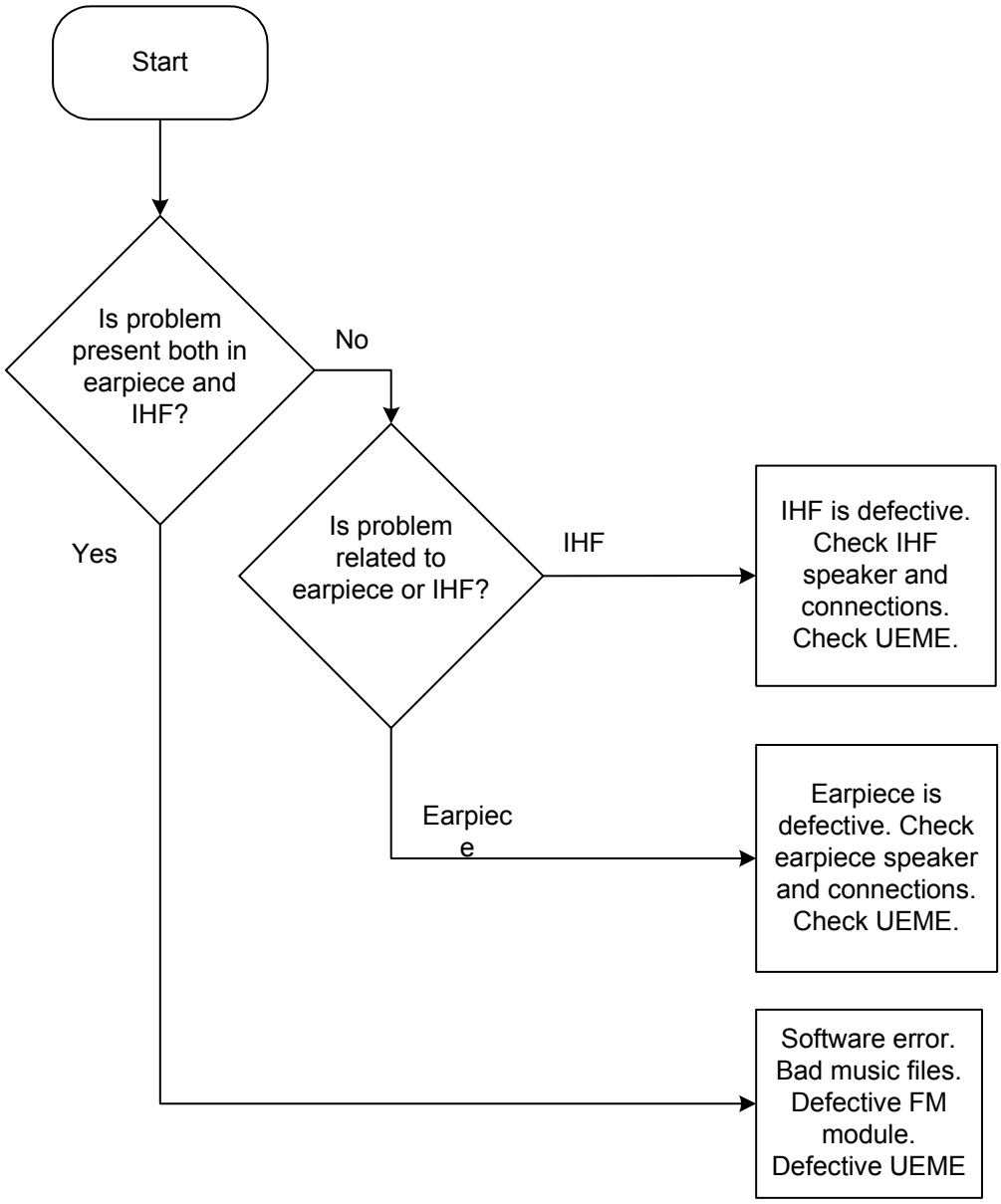
Downlink distorted audio signal


Start
Is problem present both in earpiece and IHF?
No
Yes
Is problem related to earpiece or IHF?
IHF
Earpiec e
IHF is defective. Check IHF speaker and connections. Check UEME.
Earpiece is defective. Check earpiece speaker and connections. Check UEME.
Software error. Bad music files. Defective FM module. Defective UEME

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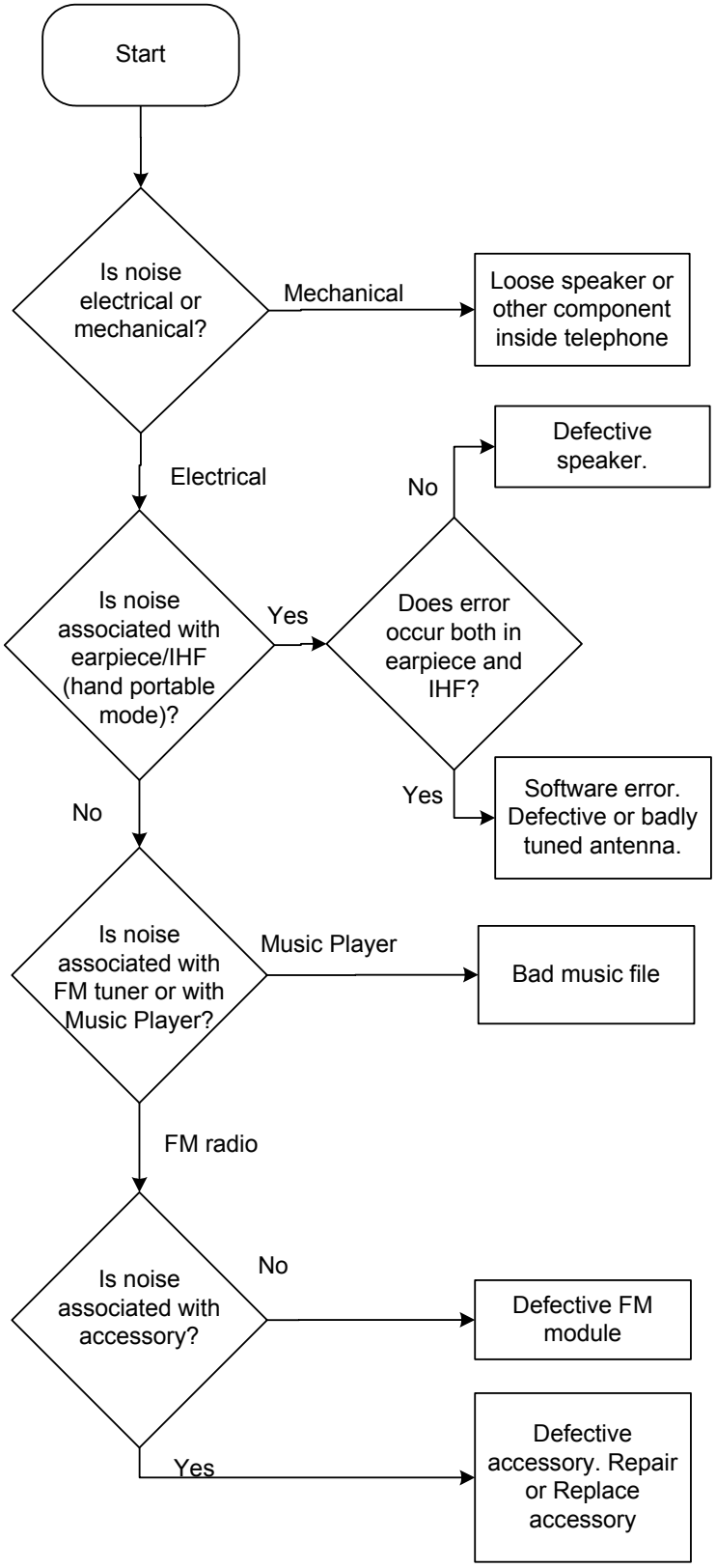
Downlink noise in audio signal



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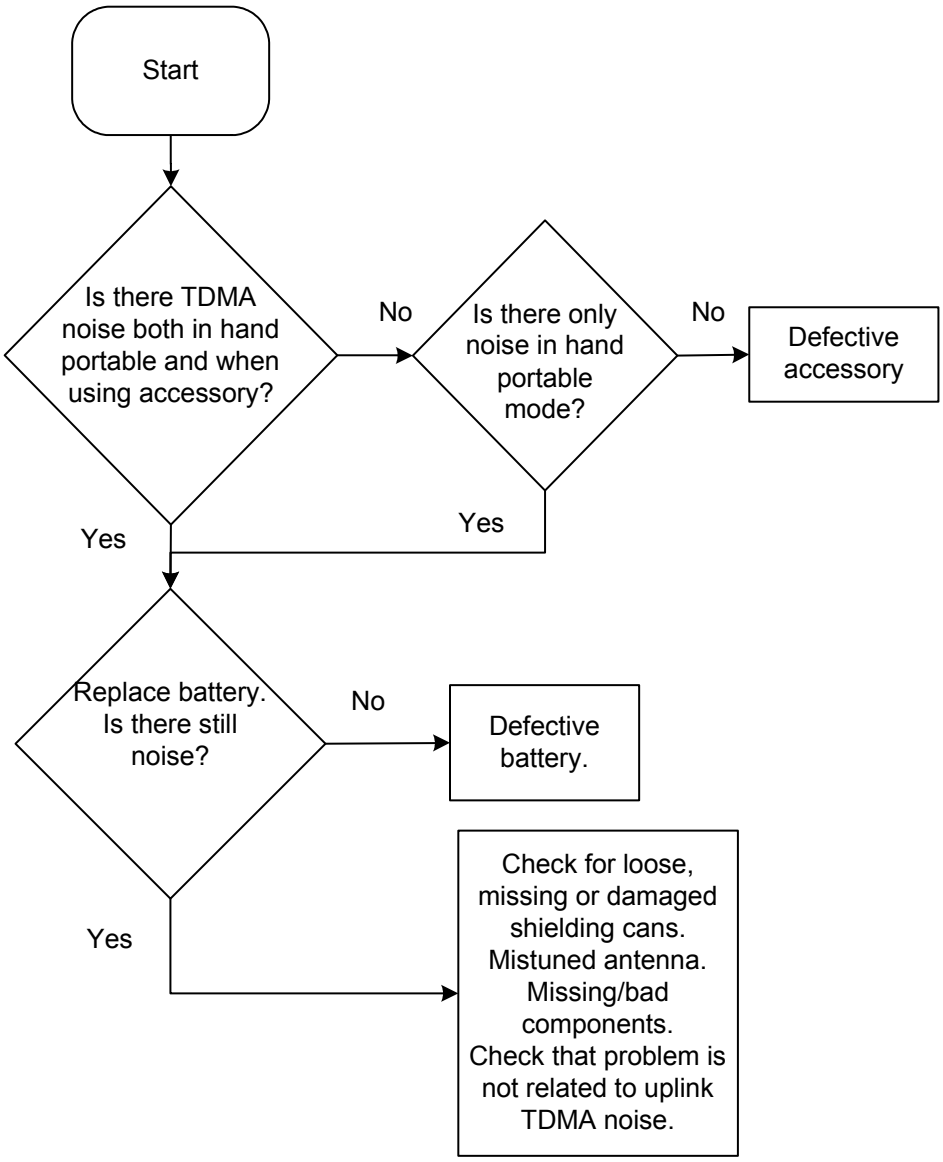
Downlink TDMA noise



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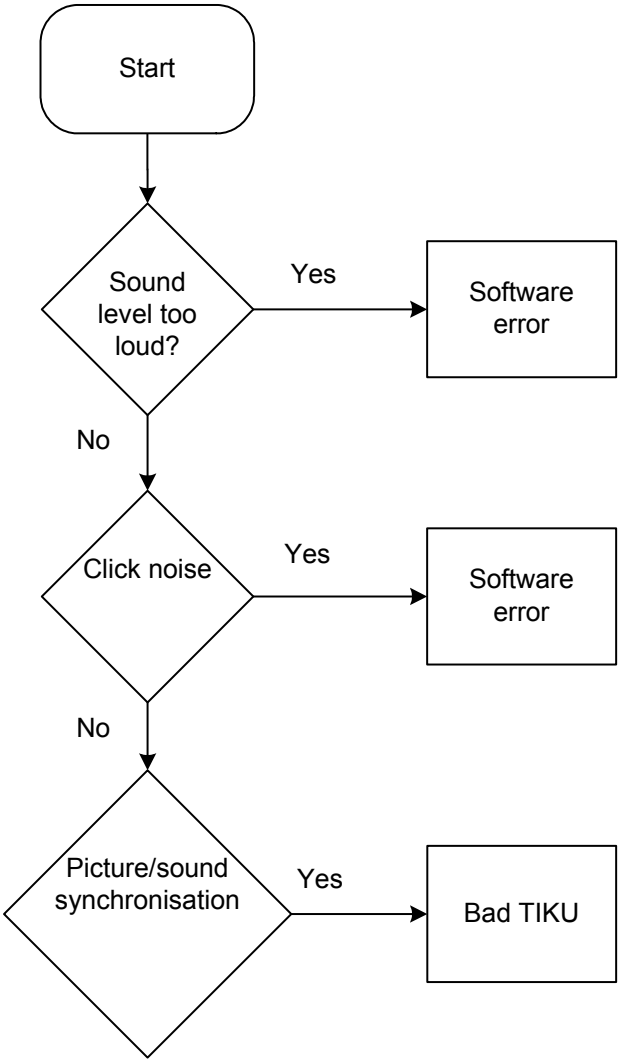
Various noise problems



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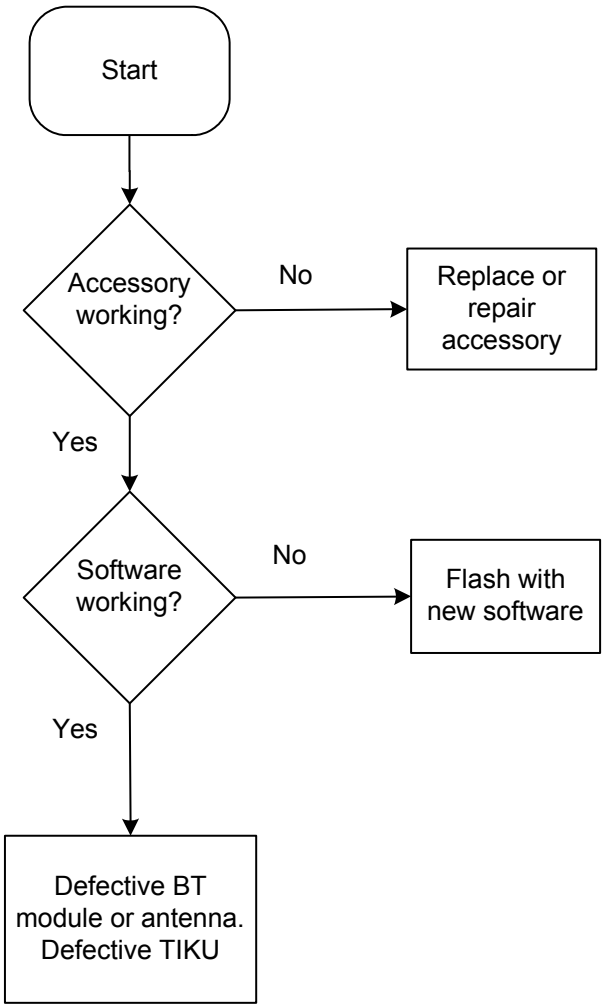
BT audio errors



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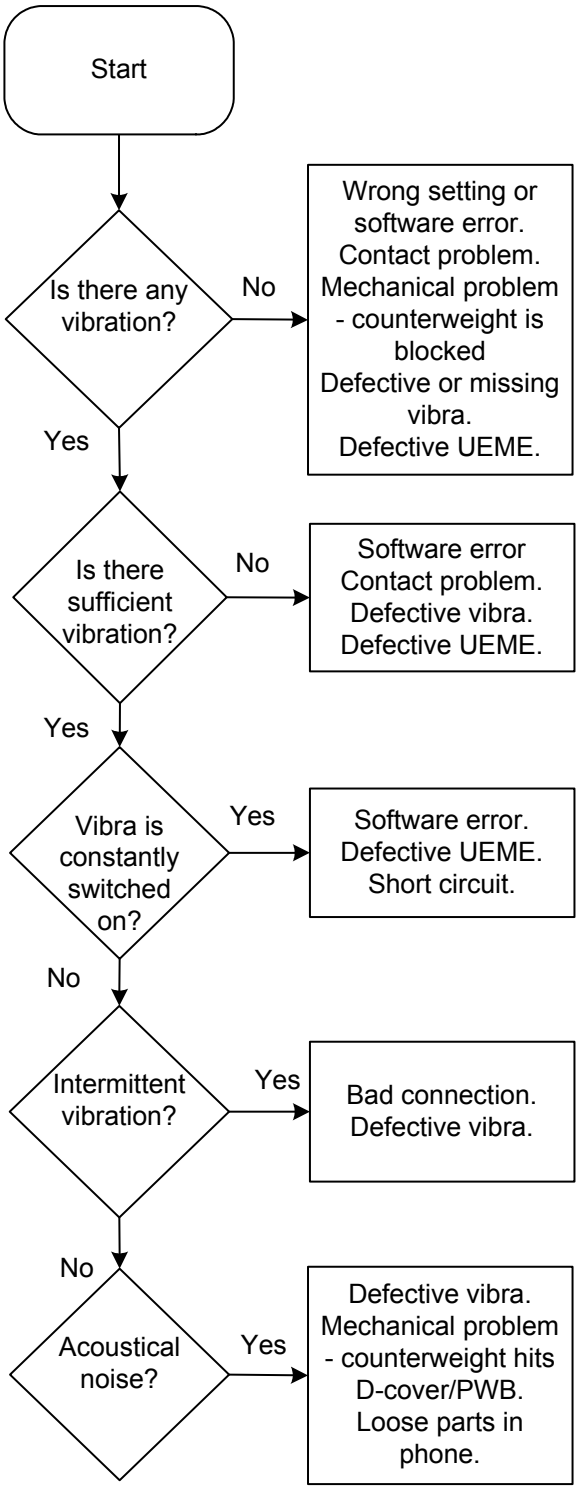
Vibra errors



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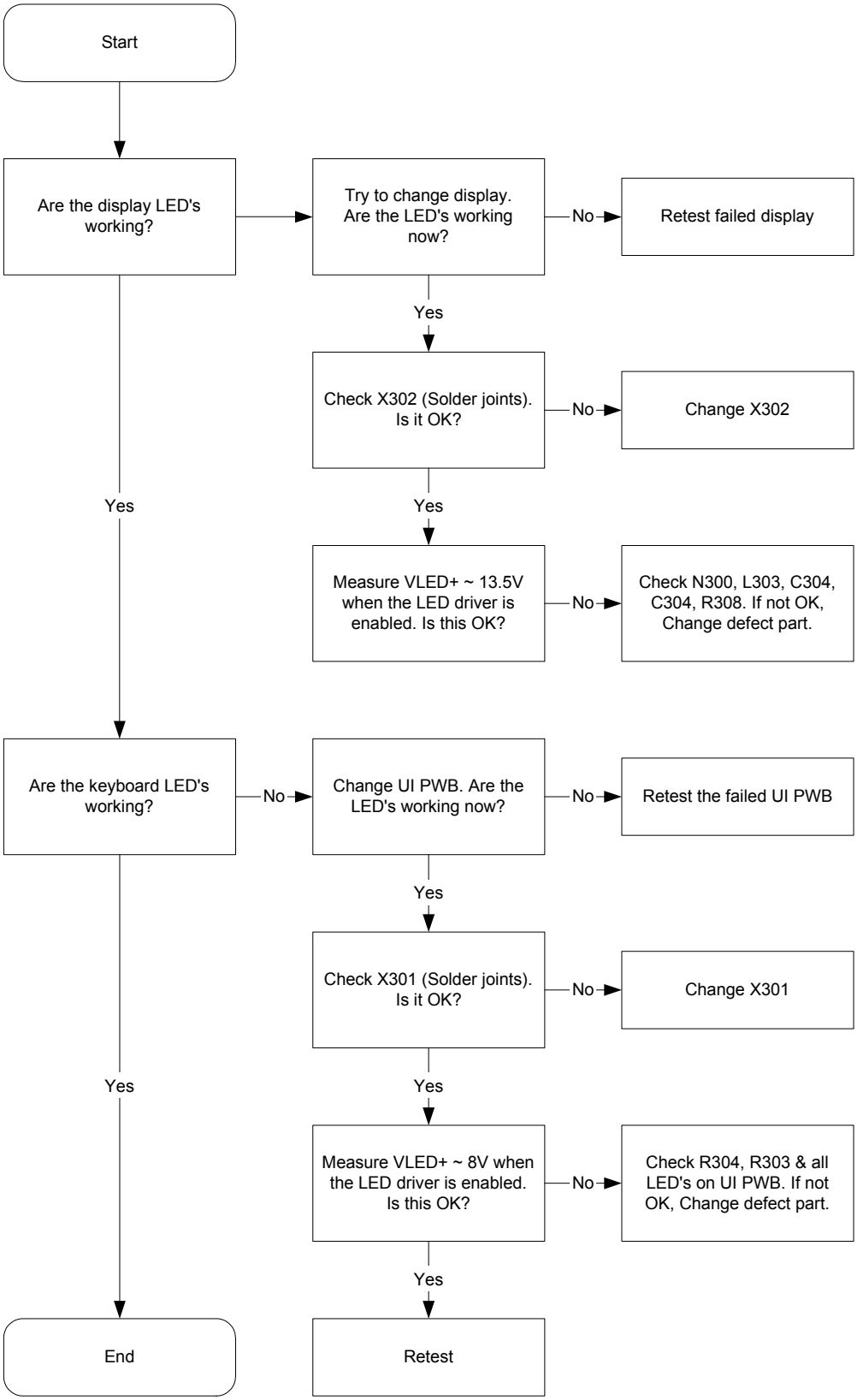
BackLight Failure


Start
Are the display LED's working?
Try to change display. Are the LED's working now?
No
Retest failed display
Yes
Check X302 (Solder joints). Is it OK?
No
Change X302
Yes
Yes
Measure VLED+ ~ 13.5V when the LED driver is enabled. Is this OK?
No
Check N300, L303, C304, C304, R308. If not OK, Change defect part.
Are the keyboard LED's working?
No
Change UI PWB. Are the LED's working now?
No
Retest the failed UI PWB
Yes
Check X301 (Solder joints). Is it OK?
No
Change X301
Yes
Yes
Measure VLED+ ~ 8V when the LED driver is enabled. Is this OK?
No
Check R304, R303 & all LED's on UI PWB. If not OK, Change defect part.
Yes
End
Retest

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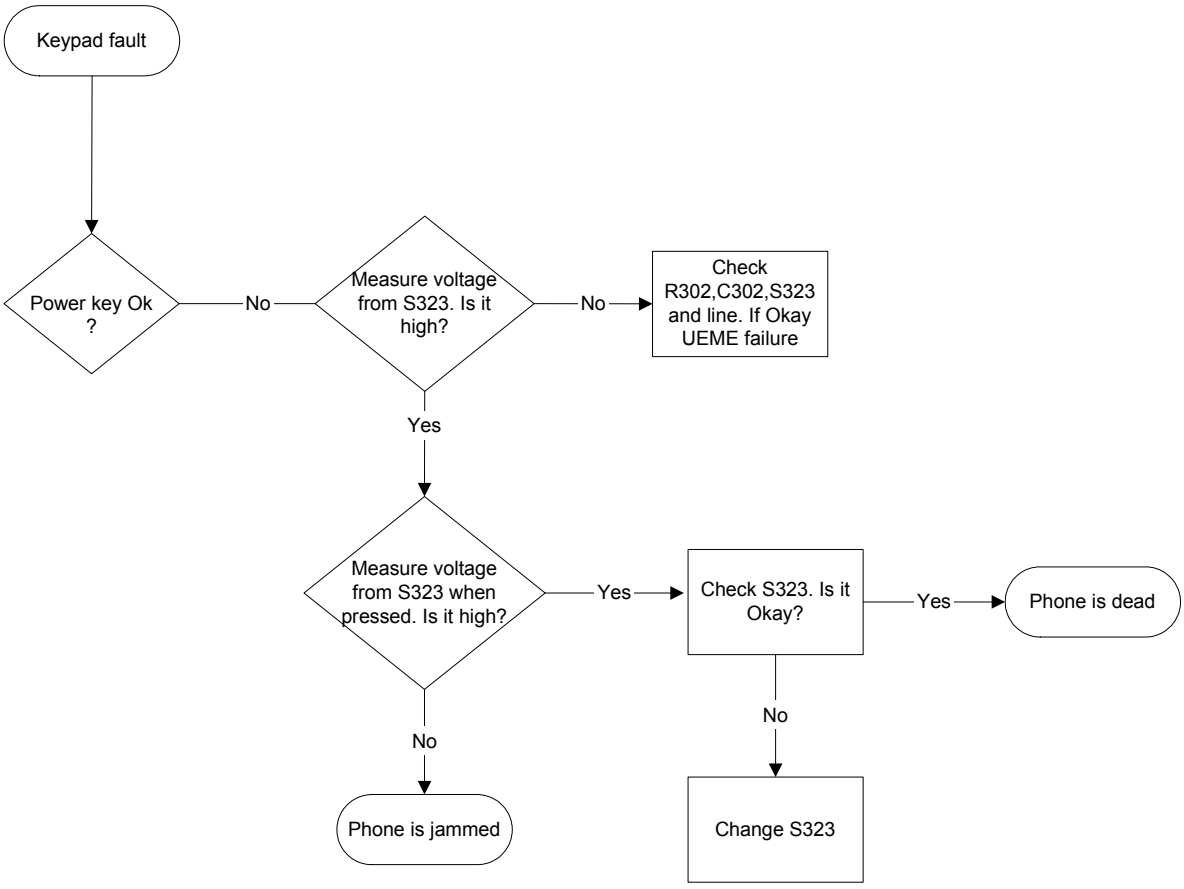
Key Failure

Power Key Failure



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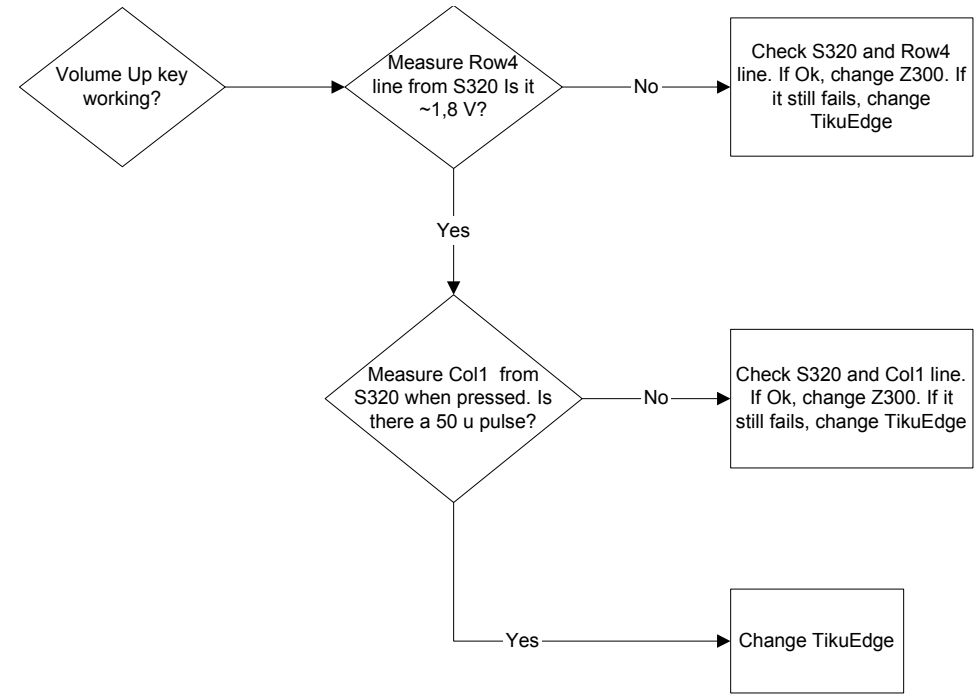
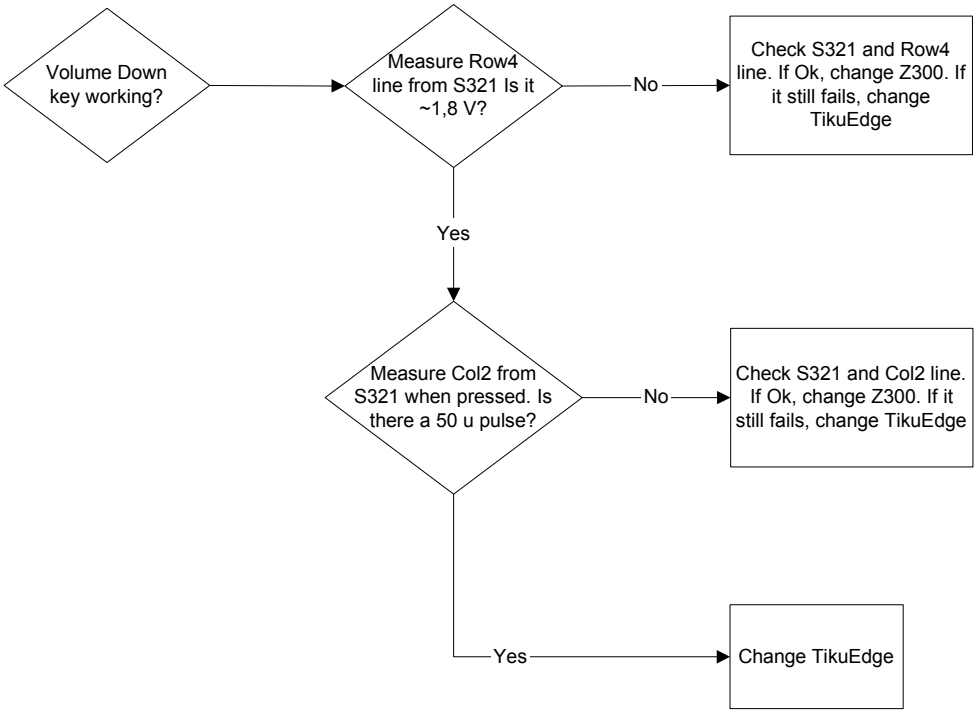
Volume Key Failure


Volume Up key working?
Measure Row4 line from S320 Is it ~1,8 V?
No
Check S320 and Row4 line. If Ok, change Z300. If it still fails, change TikuEdge
Yes
Measure Col1 from S320 when pressed. Is there a 50 u pulse?
No
Check S320 and Col1 line. If Ok, change Z300. If it still fails, change TikuEdge
Yes
Change TikuEdge


Volume Down key working?
Measure Row4 line from S321 Is it ~1,8 V?
No
Check S321 and Row4 line. If Ok, change Z300. If it still fails, change TikuEdge
Yes
Measure Col2 from S321 when pressed. Is there a 50 u pulse?
No
Check S321 and Col2 line. If Ok, change Z300. If it still fails, change TikuEdge
Yes
Change TikuEdge

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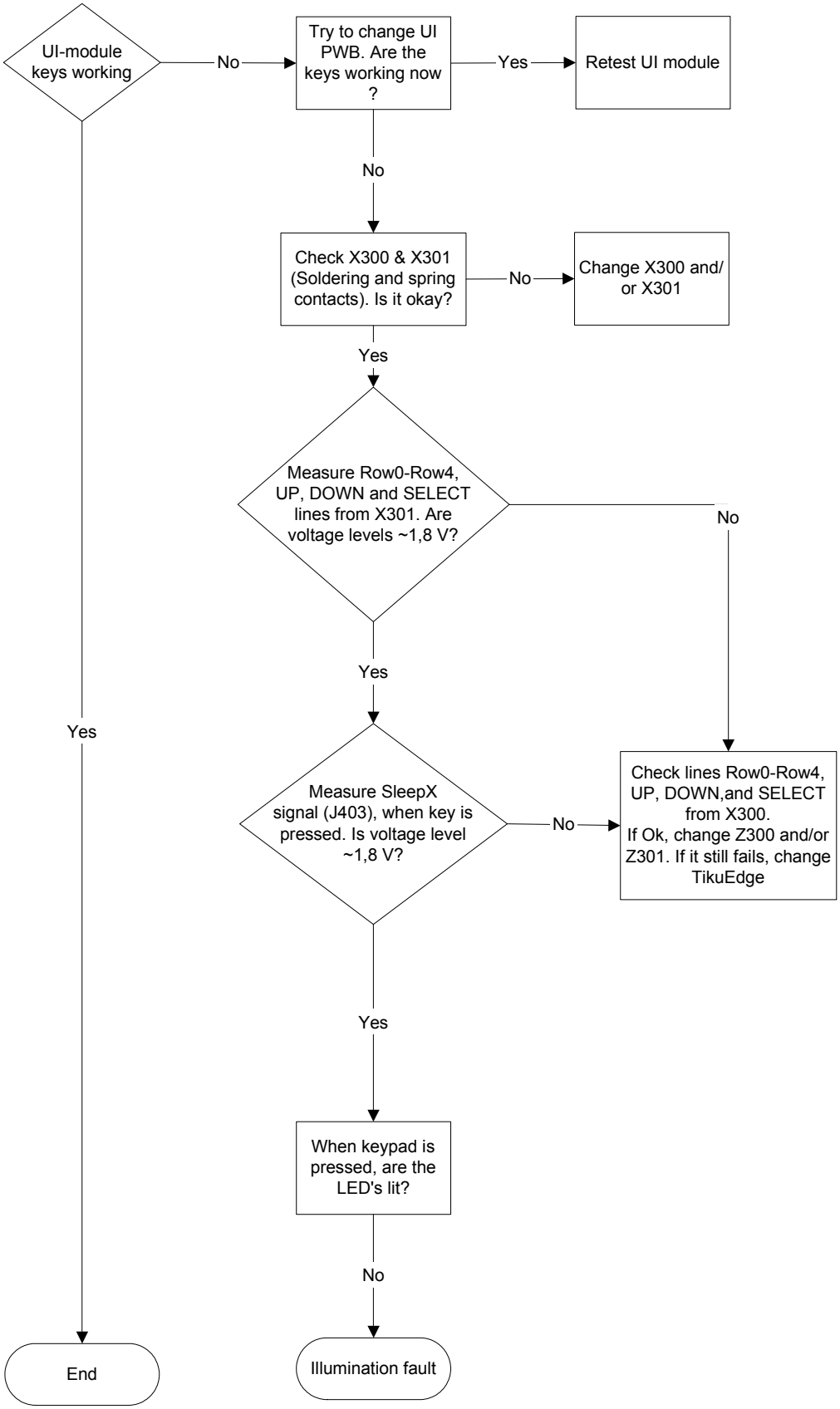
UI module keys working


UI-module keys working
No
Try to change UI PWB. Are the keys working now ?
Yes
Retest UI module
No
Check X300 & X301 (Soldering and spring contacts). Is it okay?
No
Change X300 and/ or X301
Yes
Measure Row0-Row4, UP, DOWN and SELECT lines from X301. Are voltage levels ~1,8 V?
No
Yes
Yes
Measure SleepX signal (J403), when key is pressed. Is voltage level ~1,8 V?
No
Check lines Row0-Row4, UP, DOWN,and SELECT from X300.
If Ok, change Z300 and/or Z301. If it still fails, change TikuEdge
Yes
When keypad is pressed, are the LED's lit?
No
End
Illumination fault

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